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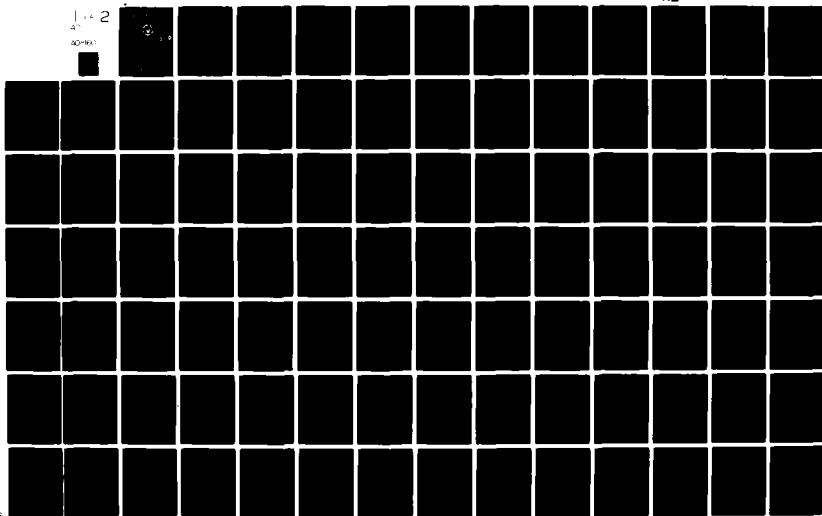
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THESIS

6 The Economic Impact Of
Domestic Military Installations
On Regional Economies

by

10 Charles K. Young

11 December 1979

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Thesis Advisor:

George Thomas

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
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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) The Economic Impact Of Domestic Military Installations On Regional Economies		5. TYPE OF REPORT & PERIOD COVERED MASTERS THESIS, DEC. 1979
		6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) Charles K Young		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS Naval Postgraduate School Monterey, California 93940		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS Naval Postgraduate School Monterey California 93940		12. REPORT DATE December 1979
		13. NUMBER OF PAGES 184
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office) Naval Postgraduate School Monterey, California 93940		15. SECURITY CLASS. (of this report) Unclassified
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report) Approved for public release; distribution unlimited		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report) Approved for public release; distribution unlimited		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Base Closure, Economic Impact, Economic Base Theory, Shift Share Analysis, Federal Impact Aid To Schools Monterey County California, Fort Ord		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This research determined that a model could be developed to predict the impact of changes in spending by a military installation on a regional economy. Such impacts are required to be estimated to implement the National Environmental Protection Act. The research examined the theoretical basis for impact determination especially economic base theory. This theory → m v		

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THE ECONOMIC IMPACT OF DOMESTIC MILITARY INSTALLATIONS
ON REGIONAL ECONOMIES

by
Charles K Young
Lieutenant Commander, Supply Corps, United States Navy
B.S., Missouri Valley College, 1970

Submitted in partial fulfillment of the
requirements for the degree of

MASTER OF SCIENCE IN MANAGEMENT

from the

NAVAL POSTGRADUATE SCHOOL
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ABSTRACT

This research determined that a model could be developed to predict the impact of changes in spending by a military installation on a regional economy. Such impacts are required to be estimated to implement the National Environmental Protection Act.

The research examined the theoretical basis for impact determination especially economic base theory. This theory applies multipliers to changes in basic activity to predict economic impact. Techniques for developing multipliers were explored with emphasis on shift share analysis and location quotients. These techniques were applied to a comprehensive survey of the Monterey County economy. An Army developed model using location quotients was analyzed, and alternate techniques based on shift share analysis were proposed. Finally the impacts on Monterey County predicted by the two methods were compared using hypothetical changes in the Fort Ord force level. Recommendations for calculating impacts and improving predictive techniques are presented.

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I. INTRODUCTION

The question of the economic impact of military spending has been raised and addressed by numerous economists, politicians, civic leaders, businessmen, and others. Despite the common occurrence of the question, both the determination methodology and the suggested impacts have varied. Such political issues as military disarmament have been argued in terms of the economic impact of the resulting decreases in military spending. The total question of the national economic effect of military spending is beyond the scope of this thesis research. The question does exist in microcosm on the state and local level. This research will focus on the local or regional impact of military expenditures.

A. PURPOSE OF THE RESEARCH

Military spending causes impacts on the national economy and on the economies of regions where military activities are located. Several aspects of military spending resulting in impacts are recognized. Among these are the employment of persons by the military for both civilian and military occupations, the procurement of supplies and services by the military, and the consumption patterns of persons on military payrolls.

These impacts have been discussed as being large, small, low, high, moderate or some other descriptive term. These are nonquantitative descriptions. No one, for instance, has declared that the economic impact of Naval Station Norfolk Virginia is 4 or 6 or .7 or 1.9. Application of such an ordinal measure would perhaps be of even less communicative value than the pure adjective descriptors. Nevertheless, how large is large, what is moderate, how small is small continue to be reasonable, but unanswered questions.

This research will attempt to examine the theories of economic impact to provide quantitative methodologies for expressing and comparing the economic impacts of the military on domestic regional economies. In addition a set of tools for uniform application to each military installation will be developed to provide the ability to communicate both relative and absolute impacts. The tools will be developed in determining the economic impact of a specific military installation on a region. The chosen installation is Fort Ord and the region, Monterey County, California.

B. THE RESEARCH QUESTION

The basic question prompting this research is: can a practical prototype model be developed to assess the impact of domestic military installations on their local economies? By practical, it is meant that the model be implementable by relatively untrained personnel without an in depth knowledge

of regional or macroeconomics. To this end the calculations should be understandable to the average college graduate, and further, the data required should be available from published government sources for every region in the United States. As a prototype the developed model will be subject to theoretical criticism and improvement through refining of its component parts.

C. SCOPE, LIMITATIONS, AND ASSUMPTIONS OF RESEARCH

The basic area of economic impact for Fort Ord is limited to Monterey County and the Salinas-Seaside-Monterey Metropolitan Area. The county and the metropolitan area define the same geographic area. Further, Fort Ord is the only military installation in the county for which an impact was determined. Other military installations in the county include the Naval Postgraduate School, and The Presidio of Monterey with the Defense Language Institute. The research is limited to model construction based on economic base theory. This theory and its underlying assumptions is discussed in Chapter III. A final limitation on the research was reliance on published data. No independent survey of business, or of consumption and expenditure patterns, was undertaken for this research. Assumptions involved in individual calculations are described with the relevant calculations in Chapters VI, VII, and VIII.

D. METHODOLOGY OF RESEARCH

Two basic research methodologies were used, data collection and literature review. The literature review was conducted in three phases. First, sources cataloged by the Defense Logistics Studies Information Exchange were examined for relevant studies on base closures and economic impact. The bibliographic sources identified in the selected studies were next obtained along with recent articles in the field. Finally local and federal government agencies were surveyed to obtain any prior relevant studies and current underlying basic data. The primary data collection was made from published sources including the State of California Departments of Employment Development, Transportation and Finance, The Monterey County Planning Department, and the Association of Monterey Bay Area Governments. Data on Fort Ord was obtained through the Facilities Engineer and published in the Second Preliminary Draft Environmental Impact Statement Part I Fort Ord [REF 21].

E. ORGANIZATION OF THE STUDY

The background of interest in economic impact of military installations is covered in Chapter II. The basic concepts underlying economic base theory, the theoretical foundations for this research are described in Chapter III. Chapter IV deals with the socioeconomics of Monterey County as a whole and develops linkages with Fort Ord. The

relevant socioeconomic characteristics of Fort Ord and its population are discussed in Chapter V. Analysis of the Monterey County economy using shift share techniques is presented in Chapter VI. The development of income and employment multipliers using shift share and location quotient techniques is presented in Chapter VII. Chapter VIII examines the economic impact model developed by the Construction Engineering Research Laboratory and proposes alternative methods of impact determination. The conclusions derived from the research are contained in Chapter IX.

II. MILITARY INSTALLATION IMPACT-BACKGROUND

Wassily Leontief, the founder of modern input/output economic study in a classic article considered quantitatively the overall impact of a shift in spending from "military goods" to "civilian goods" on the national economy [Ref. 13:184-222]. Although discussed before Leontief, debate has continued since on the welfare implications of military spending. Within the broader question of the national welfare implications of military spending, exists the question of the impact of changes in military spending of particular installations on their attendant local economies. The large number of military installation spending changes and their magnitude after 1961 lends particular saliency to study in this area. The background surrounding the changes, and the awakening interest in the resulting economic impacts are covered in this chapter.

A. DEFENSE REALIGNMENT ACTIONS AND THE MILITARY BASE STRUCTURE

Defense Department action to realign and contract the structure of military bases in the United States has continued from 1961 to the present almost without interruption except for the buildup of forces required by the war in Southeast Asia.

The realignment and base closing actions may however be divided into two time periods, those from 1961 to 1969 and those after the peak of the defense force buildup in Southeast Asia in 1969.

1. Reductions from 1961-1969

The administration of President John F. Kennedy began a series of defense base reorganizations and consolidations in March 1961. From then until 1969 over 1100 military activities were affected [Ref. 4:11]. According to Lynch, the reorganization and consolidation actions eliminated 211,017 civilian and military positions with a projected cost savings to the Department of Defense of \$1.5 billion per year [Ref. 14:8].

2. Reductions After 1969

Since the force levels reached their peak during the Southeast Asia conflict, the number of military personnel in the armed forces has been reduced to a 1978 level of 2.1 million from the 1969 level of 3.5 million. Civilian employment in the Defense Department fell during the same period from 1.4 million to 1.0 million. The decline in force levels resulted in actions eliminating 1,650 defense installations and properties around the world [Ref. 23:7].

Typical of these latter reduction actions were those announced November 22, 1974 by the Secretary of Defense. The elimination of 11,500 military and 11,600 civilian billets

was announced in order to reduce defense costs for the next decade by \$3.3 billion. Among the actions to be taken were closings of the Frankford Arsenal in Philadelphia, the Savannah Army Depot, Savannah Illinois, Lexington Blue Grass Army Depot, Lexington Kentucky, Pueblo Army Depot, Pueblo Colorado, and Sharpe Army Depot, Lathrop California. The Air Force also announced inactivation of three Tactical Air Division Headquarters at Little Rock Alabama, Spring Lake North Carolina, and Clovis New Mexico [Ref. 24:12].

B. RECOGNITION OF ECONOMIC IMPACT

The economic impact of the closures, reductions and realignments on local communities was not unrecognized by the communities involved. A spokesman for the Metuchen, New Jersey Chamber of Commerce testifying before the Senate Commerce Committee in 1961 about the closure of the Raritan New Jersey Army Depot asked if the Defense Department had considered the 1300 employees with more than 15 years service at the arsenal, the 6.2% unemployment rate, the expenditure in central New Jersey of \$11 million annually from civilian employee income, and the \$45.3 million annual purchases of local supplies and services [Ref. 4:2].

The answer to the Metuchen New Jersey spokesman, three years in coming, was no, the economic impacts were not to be considered. The Secretary of Defense in 1964 testimony to the House Armed Services Committee reemphasized that the Pentagon was not responsible for local economic demand

maintenance and it could not depart from the standard of military effectiveness to aid a distressed area [Ref. 14:10]. The emphasis in the announcements of closures and realignments has been the net savings to the government reflected in the Department of Defense budget. Secretary Schlesinger's base closure announcement in 1974 explicitly emphasized the \$3.3 billion to be saved to the defense budget in the next decade by the realignment.

The recognition of economic impact resulting from defense department action came about not so much through the anguish of the communities involved in base closure and reduction actions but through a new vehicle of government concern. The passage of the National Environmental Protection Act of 1969 marked the beginning of a concerted effort to include in the consideration process the economic impacts of realignment actions. Initially the act applied only to truly environmental issues in the biologic sense. Executive Orders extended the provision of the Act to all Federal Agencies and their major programs (E.O. 11514 of 5 March 1970 Protection and Enhancement of Environmental Quality, E.O. 11752 of 19 December 1973, Prevention, Control and Abatement of Environmental Pollution at Federal Facilities) The requirement to consider socioeconomic environmental impacts was established by court decisions (especially McDowell vs. Schlesinger U.S. District Court, Western District of Missouri, Western Division, 75-CU-234-W-4 19 June 1975).

C. ACADEMIC RESEARCH

Research into the economic environmental impact of military bases, despite the need generated by the Environmental Protection Act, has been limited. Base closings have drawn the greatest number of studies. Openings of bases and the impact of ongoing base operations have also been studied. The methods of approach have been limited generally to specific case studies or economic base analysis. Buckley [Ref. 4] also surveyed studies using economic base theory. In a survey of the various studies done through 1976, Buckley identifies case specific studies by Breese of military and non-military base openings, by Coon of the opening of an ABM base, and by the Office of Economic Analysis. Buckley also surveyed studies using economic base theory which developed employment or income multipliers. In the survey were studies by Weiss and Goodins (1968), Sasaki (1963), Garrison (1972), and especially by Lynch (1969) [Ref. 14:5,8-18].

Lynch's study used economic base theory, location quotients and employment multipliers to determine the impact of changes in military and federal civilian employment on 15 communities. The areas of impact studied were local employment, retail sales, housing and local government finances. Lynch found a high multiplier for Federal civilian employment (3.58) and a lower value (1.662) for military

employment. He also found significant impact on low cost housings, and local government revenues. Retail sales did not show a significant change in his studies [Ref. 14:xiv-xix].

A major study noted by Buckley which used input/output analysis to determine economic impact was a 1974 study by V. Howard Savase on the interdependence of the San Antonio Texas economic structure and defense establishment. This study used a 66 sector input/output table and yielded employment and income multipliers of 2.06 and 2.00 respectively. Another input/output study done by the Battelle Institute for the Office of Economic Analysis studied the impact of Badger Army Ammunition Plant in south central Wisconsin. The multipliers found in that study were 1.27 for income and 1.23 for employment [Ref. 4:21-25].

Finally in building their economic impact forecast model, the Construction Engineering Research Laboratory studied 64 activities of the Department of the Army. Their initial model had a high degree of impact overstatement. Subsequent study led to refinements to the model including using more disaggregated data. The resulting model is discussed more fully in Chapter VIII [Ref. 25:7].

III. ECONOMIC BASE THEORY

The calculations, assumptions, and methods used in this research rely on economic base theory to provide a framework for decision making and a model for mathematical development. This chapter will examine the concepts of economic base theory and the strengths and limitations associated with it.

A. ECONOMIC BASE THEORY CONCEPTS

Economic base theory applies the concept of international trade to a region. In international trade nations engage in production for sale to other nations, and for self-consumption. The sale of goods to other nations provides currency for the purchase of goods from abroad. Increasing demand for a country's goods may lead to additional employment. Economic base theory at the regional level proposes that the exports of a region to the rest of the world determines the direction and rate of growth of that region.

Exports from a region need not take the form of goods. For the purposes of economic base theory exports are goods and services paid for with the money originating outside the region under study. Thus the expenditures in a region by tourists from outside the region for goods and services are

exports even if no tangible goods physically leave the region. Also the expenditures made by the national government in a region are exports even though some of the funds spent in the region may have indirectly originated in that region.

Some industries in a region may specialize in providing goods and services which are exported. Tourism, manufacturing, and agriculture may be included in this export category; other industries may be included, depending on the source of their customers funds. When an industry does specialize in producing goods or services which are exported it is considered a part of the export base of a region or a basic industry.

The demand for the production of basic industries is by definition derived in part from outside the region. Employment and income in that industry are by definition determined in part by the exogenous demand in that industry. The employees of a basic industry and their dependents require support services from the communities in which they reside. The workers providing the support services to the basic industry employees are also consumers of the support services in their own right. The support services provided in the community such as wholesaling, transportation, and utilities, are referred to in economic base theory as the non-basic industries.

Both the basic and non-basic industries in the economy are influenced by changes in the demand for basic industry goods and services. If demand for the goods and services of the basic industry expands, a corresponding and proportional expansion in the basic industries is expected. The expansion in the basic industries in turn generates an expansion in the demand for and provision of supporting goods and services.

In economic base theory all income, employment and activity may be divided into basic and non-basic components. The sum of the basic income, employment or activity, and the non-basic income, employment or activity, is equal to the total income, employment or activity, in a region. The exact methodology for making this division is complex and is discussed in chapters VI and VII.

The base ratio describes the relationship between basic and non-basic components of a regional economy. It is the ratio of basic income, employment or activity, to non-basic income, employment, or activity. If there are in a region three non-basic workers for each basic worker the base ratio would be 1:3. This means that for every new basic sector job, three new jobs would be created in the non-basic sector. Also a decline of one basic job will decrease non-basic employment by three jobs.

The base multiplier differs from the base ratio in that it describes the relationship between the basic component of a regional economy and the total economy. It is the ratio of

basic income, employment, or activity to total regional income, employment or activity. If the base ratio in a region is 1:3, then the base multiplier will be the total employment ($1+3=4$) divided by the basic employment (1) or 4.

The base multiplier of 4 means that for each change in basic sector employment of 1 the total employment change basic and non-basic will be 4. If a change in basic demand and therefore basic employment can be determined or postulated then that change multiplied by the base multiplier will yield an estimate of the total change in employment due to change in basic demand.

B. ASSUMPTIONS UNDERLYING ECONOMIC BASE THEORY

Inherent in economic base theory are certain assumptions about the nature of the regional economy. Four assumptions will be described in this section. The assumptions are labelled for identification purposes as : (1) External demand assumption, (2) Basic to service link assumption, (3) stable economy assumption, and (4) zero intercept assumption.

1. External Demand Assumption

Key to economic base theory is the assumption that the growth of a regional economy is dependent on change in outside demand for regional goods and services. Taking the world as a region, obviously economic growth is the result of purely internal demand. As regional focus becomes

narrower however, the defined region becomes less self-sufficient. Goods and services are sold beyond regional boundaries to purchase imports of goods or services in which the region is not self-sufficient. The region may become specialized in producing certain goods or services. These industries grow as demand for the specialized product from without the region grows.

2. Basic-Service Link Assumption

If external demand is the cause of growth in the basic industries of a region, the postulation that this growth generates growth in the non-basic sector of the regional economy is called the basic-service link. The assumption is made that the demand for services by the basic sector increases as the basic sector increases, and that the services are provided by the non-basic sector. Underlying this postulation is the assumption that the required new services are provided inside the region and not provided by industries remaining outside the region.

3. Linearity Assumption

The measurement and prediction of total economic growth derived from basic sector growth depends on the relationship between total economic activity and basic economic activity remaining linear and stable over time. At least two kinds of instability are assumed not to exist. The first kind of instability is productivity change. In

economic base theory it is assumed that increased demand is met only by increased employment because the productivity of the existing industries is stable over time, and economies of scale do not exist. The second kind of instability is change in the demand for services relative to the demand for basic industry output. The assumption made is that each new worker in the basic industries demands the same level of services from the non-basic industries as each previous worker.

4. Zero Intercept Assumption

The economic base multiplier may be calculated by taking the total activity of a region in a period and dividing by the basic activity of the region in a period. This yields the general slope equation $y = mx$, where y is total activity, m is the multiplier, and x is export activity. When an economic region is isolated it does not import or export and is at the stage of subsistence self-sufficiency. Afterward, when limited trade begins, new activity in the basic sector generates increased activity in the total economy but this activity growth is of the general slope equation form $y = mx + b$, where b is the y intercept, or the level of non-basic services existing before the first basic activity takes place. If this form represents the model then the assumption that b is equal to zero is incorrect and the multiplier must be instead found from the first derivative of the equation $y = mx + b$ or $dy = m dx$. In

the derivative form the multiplier is equal to the change in total activity divided by the change in basic activity. The theoretical superiority of the change in activity method is discussed in Chapter VII.

C. STRENGTHS AND LIMITATIONS

Economic base theory, built on the assumptions described above is used generally because of the simplicity of calculations and the availability of data, despite the problems arising from oversimplification. The major strength of the theory is that the model is simple to construct relative to input/output or other models. The basic requirement for developing an economic base model is the availability of observations of regional and national economic activity for one or two periods. The data is generally available and a study may be done quite inexpensively. A pocket calculator is as sophisticated a tool as is necessary. The limitations of the theory however must be recognized to offset the simplicity and facility of operation of the model. The following technical problems are discussed below: the measurement problem, the sector problem, the instability problem, and the averaging problem.

1. The Measurement Problem

The economic base theory applies to employment, income or activity for any single time period. At a single point in time employment, income or activity are directly

related and the multiplier derived from any measure will be equally accurate. Employment is generally used to calculate the multiplier because of the collection of this data on a detailed area basis by state and federal agencies. When more than one time period is used in calculating the multiplier the link between income and employment existing at a single point in time is subject to at least two variances. The first variance is the result of differing wage levels in different industries. A change in employment will result in a different change in income depending on the wage level of the employees in the changed industry compared to other industries. The same change in employment may result in a different change in income. The second variance is due to technical change. As capital and technology are applied to increase the productivity and quality of output of an industry, output and income may change without a change in employment.

2. The Sector Problem

Economic base theory relies on the ability to differentiate basic from non-basic activity. While several approaches have been developed to do the differentiation, short of a complete survey, no approach is entirely accurate. A complete survey is a difficult and costly undertaking and neglects the basic strength of the theory, the reliance on published data. The approaches used to

distinsuish basic from non-basic activities and the difficulties inherent in these approaches are developed in Chapter VII.

3. The Instability Problem

The stability of the base ratio over time is one of the assumptions of economic base theory. Certain technical problems are however associated with this assumption. First the stability of industry mix over time is assumed. The proportion of total industry represented by any single industry may or may not be stable over time. Clearly the success of an industry is dependent on the tastes and demands of consumers. The television and electronics industry did not exist before the first third of this century. Secondly the increasing productivity of employment results in changing demand for goods and services and for more and additional services. The ratio of demand for goods compared to services if not constant precludes acceptance of the assumption of a constant basic to service or base ratio over time. The structural change problem is discussed in Chapter VI in relation to selecting a time period for analysis.

4. The Averaging Problem

The base ratio and base multiplier derived through economic base theory application are averages for the region

as a whole. They are applicable to the change in income, employment or activity of a specific industry only when the change in that industry is the same as the average of all industries. An industry will differ from the average based on the differing propensity of its employees to produce local consumption (the propensity to earn income and the propensity for that income to become local income) and based on whether the source of an industries inputs are internal or external to the region. The averaging problem is further discussed in Chapters VII and VIII.

IV. THE CIVILIAN ECONOMIC BASE

A precursor to understanding the nature of the impact of the Fort Ord sector on the local economy is a description of the economy of Monterey County, which is provided in this chapter. Key elements of this description are the population of the county, the income, consumption and employment of its people, and the industrial and governmental activities. Fort Ord as a sector of the economy is treated separately in Chapter V.

A. LOCATION AND GEOGRAPHY

Monterey County is located astride the central coast mountain range of central California, physically limited on the east by the Gabilan and Diablo ranges, and by Monterey Bay and the Pacific Ocean on the west. The county is oriented along the Pacific Ocean coast northwest to southwest, approximately 100 miles long and averaging 30 miles wide, at latitude 36 40' N and longitude 121 37' W. The elevation varies from sea level to 5844 feet at Junipero Serra peak 12 miles inland. Political boundaries are formed by Santa Cruz County on the north, San Luis Obispo County on the south, and San Benito, Kings, and Fresno counties on the east. Monterey County contains 3324 square miles, more than the combined area of Rhode Island and Delaware. The land

area is predominantly (89%) devoted to agricultural use, with urban areas accounting for only 1.2% of the land area. The federal government constitutes the largest single land holder, with title to 27.1% of the land area. Other government agencies hold 2.2% and 70.7% of the land is privately held [Ref. 5:iii]. The twelve incorporated cities occupy a total of 49.06 square miles [Ref. 17:10].

B. POPULATION

The population of the county at 1 January 1979 was 277,500 [Ref. 17:10]. Table I details the area, population and density of the twelve incorporated cities of the county as of 1 January 1979. Salinas and Seaside had the largest populations and after Pacific Grove were the most densely populated cities. Nearly 72% of the county population was included within the incorporated areas. The population of the county increased from 1960 to 1970 at an average annual rate of 2.24%, at an annual average rate of 1.59% from 1970 to 1976 and 2.0% for the entire period. This rate of growth was less than the statewide growth for the same period of 2.2% and was more than the national growth rate of 1.1%. The county growth rates are indicated in Table II. The growth in individual cities is shown in Table III. Projections of future population growth have been made by the California Department of Transportation, the California Department of Finance and the Association of Monterey Bay Area Governments. The projections are summarized in Table IV.

TABLE I
INCORPORATED CITIES
AREA, POPULATION, DENSITY
MONTEREY COUNTY
1 January 1979

CITY	SQUARE MILES	ACRES	POPULATION	DENSITY PER SQUARE MILE
CARMEL	1.00	640	4,761	4,761
DEL REY OAKS	.46	295	1,543	3,354
GONZALES	.60	387	2,663	4,438
GREENFIELD	.60	382	3,585	5,975
KING CITY	1.73	1,110	5,326	3,078
MARINA	9.60	6,140	19,411	2,022
MONTEREY	7.89	5,050	27,399	3,473
PACIFIC GROVE	2.70	1,728	16,358	6,059
SALINAS	13.70	8,737	77,760	5,676
SAND CITY	.75	480	190	253
SEASIDE	9.00	5,760	34,343	3,815
SOLEDAD	1.03	658	5,557	5,395
SUBTOTALS	49.06	31,367	198,897	4,054
UNINCORP			78,567	
TOTALS			277,464	

SOURCES:

POPULATION, CALIFORNIA DEPT OF FINANCE

AREA, MONTEREY PENINSULA CHAMBER OF COMMERCE

DENSITY, AUTHOR

Note: MARINA AND SEASIDE INCLUDE POPULATION AT FORT ORD

**TABLE II
POPULATION GROWTH
MONTEREY COUNTY**

YEAR	POPULATION
-----	-----
1960	198,351
1970	247,450
1976	272,095
1979	277,464
 ANNUAL AVERAGE GROWTH RATES	
-----	-----
1960-1970	2.24%
1970-1976	1.59%
1976-1979	.65%
1960-1976	2.00%
1960-1979	1.78%

SOURCES:

1960-1976 ASSOCIATION OF MONTEREY BAY AREA GOVERNMENTS
1979 CALIFORNIA DEPARTMENT OF FINANCE

**TABLE III
POPULATION GROWTH
MONTEREY COUNTY
1970-1976**

	POPULATION		POPULATION	PERCENT
	1970	1976	CHANGE	CHANGE
MONTEREY COUNTY	247,450	272,097	24,647	10.0
CARMEL	4,525	4,756	231	5.1
DEL REY OAKS	1,823	1,620	-203	-11.1
GONZALES	2,575	2,619	44	1.7
GREENFIELD	2,608	3,386	778	29.8
KING CITY	3,717	5,017	1,300	35.0
MARINA (W/O FT ORD)	9,715	12,098	2,383	24.5
MARINA		22,784		
MONTEREY	26,302	27,481	1,179	4.5
PACIFIC GROVE	13,505	16,208	2,703	20.0
SALINAS	58,896	73,438	14,542	24.7
SAND CITY	212	211	- 1	-.5
SEASIDE (W/O FT ORD)	21,113	20,391	-722	- 3.4
SEASIDE	36,883	34,360	- 2,523	- 6.8
SOLEDAD	4,222	5,342	1,120	26.5
UNINCORPORATED	92,182	74,875	-17,307	-18.8
FORT ORD	32,128	24,657	-7,471	-23.3
=====				

**SOURCE:
MONTEREY COUNTY PLANNING DEPARTMENT**

**TABLE IV
PROJECTED POPULATION
MONTEREY COUNTY
1995**

PROJECTION BY	MCTS	DOF	AMBAG
Base Year	1977	1975	1976
Base Population	272,097	267,700	272,100
1995 Population	411,388	383,700	390,100
Change	139,291	116,100	118,000
% Change/Year	2.42	1.82	1.91

SOURCES:

MCTS-MONTEREY COUNTY TRANSPORTATION STUDY

DOF- CALIFORNIA DEPARTMENT OF FINANCE

AMBAG-ASSOCIATION OF MONTEREY BAY AREA GOVERNMENTS

1. Age of the Population

Projections of changes in employment, housing demand, consumption patterns, and demand for government services can be related to changes in the distribution of the population by age. Variations from the national pattern when existent are subject to additional scrutiny and analysis. As indicated in Table V, the population of Monterey County in 1976 was more youthful than the national population. The indicated trend however is that as a group the county's population will be getting slightly older by 1995. An example of the impact of this trend is seen in public school enrollment which declined from 55,136 in 1970 to 54,952 in 1976 despite the population growth of 25,000 [Ref. 1].

2. Race And Ethnicity

The racial characteristics of the county vary remarkably from the remainder of the United States. The population is noticeably less caucasian, but is also significantly less black. Where the United States population was in 1977 86.6% white, Monterey County was 68.4% white in 1976, and where the United States was 11.6% black, the population of Monterey County was 4.3% black. The Mexican-American and other racial or ethnic groups while comprising only 1.8% of the United States population represented 8.1% of the county population as detailed in Table VI.

TABLE V
POPULATION DISTRIBUTION BY AGE
UNITED STATES AND MONTEREY COUNTY
(Percent)

AGE	UNITED STATES	MONTEREY COUNTY			
	1977	1976	1985	1990	1995
0-15	24.5	23.3	22.9	22.4	22.2
16-64	64.6	68.6	68.7	69.0	69.0
65-	10.9	8.1	8.4	8.6	8.8
Total	100.0	100.0	100.0	100.0	100.0
=====					

SOURCES:

STATISTICAL ABSTRACT OF THE UNITED STATES, 1978
ASSOCIATION OF MONTEREY BAY AREA GOVERNMENTS

**TABLE VI
RACIAL DISTRIBUTION
(PERCENT)
1976-1977**

RACE	FORT ORD MILITARY	MONTEREY COUNTY CIVILIAN	UNITED STATES
<hr/>			
WHITE	63.7	68.4	86.6
BLACK	28.1	4.3	11.6
MEXICAN AMERICAN	n.s	19.2	n.s
OTHER	8.2	8.1	1.8
<hr/>			
TOTAL	100.0	100.0	100.0
<hr/>			

SOURCES:
FORT ORD ENVIRONMENTAL IMPACT REPORT
STATISTICAL ABSTRACT OF THE UNITED STATES, 1978

3. Population In School

Approximately 20% of the entire population of Monterey County was enrolled in schools during the fall of 1977. Of these persons enrolled, 16,854 or more than 5% of the county population were enrolled in grades 9-12. Public education was predominant with private schools enrolling 1552 students in high school grades and 2087 in other grades. Table VII details enrollment by type of education and by level of education for grades K - 12. Additionally 12,900 persons 16 and over were enrolled full time in schools, colleges and public schools [Ref. 1:10].

TABLE VII
SALINAS-SEASIDE-MONTEREY SMSA
SCHOOL ENROLLMENT
FALL 1977

	TOTAL -----	GRADES 9-12 -----
PUBLIC SCHOOLS	52,122	15,332
VOCATIONAL EDUCATION	11,714	11,714
CONTINUATION	449	449
OTHER SPECIAL EDUCATION	1,160	436
PRIVATE SCHOOLS	3,639	1,552
	-----	-----
TOTAL	55,751	16,884

SOURCE:
DEPARTMENT OF EDUCATION

C. INCOME IN MONTEREY COUNTY

The Monterey peninsula includes some of the highest income subareas in the State of California, [Ref. 21:221] while also including significant areas of low and very low income households. The sources of income, and distribution of income are described in this part.

1. Personal Income

The personal income (current year dollars) of Monterey County has grown from \$ 1.255 billion in 1974 to \$1.918 billion in 1976 after increasing at an average annual rate of change of 8% from 1969 to 1974. The major sources of personal income in 1975 were farming \$ 396 million, dividends, interest, and rent \$ 296 million, transfer payments \$241 million and military payrolls \$248 million. Personal income sources are detailed in Table VIII.

**TABLE VIII
MONTEREY COUNTY
1975 INCOME BY SOURCE**

1975 Income By Source	\$ (,000)
<hr/>	
BY PLACE OF WORK:	
WAGES AND SALARIES	\$ 1,052,265
OTHER LABOR INCOME	43,097
PROPRIETORS INCOME	245,565
FARM PROPRIETORS	160,069
NONFARM PROPRIETORS	85,496
	<hr/>
TOTAL	\$ 1,340,927
 FARM AND NON FARM INCOME:	
FARM	\$ 235,794
NONFARM	1,105,133
TOTAL	\$ 1,340,927
 NONFARM INCOME:	
NONFARM	\$ 1,105,133
PRIVATE	636,902
MANUFACTURING	116,069
MINING	10,120
CONSTRUCTION	44,415
TRADE	189,671
FIRE	32,202
TCPU	62,992
SERVICES	164,679
OTHER	16,754
GOVERNMENT	468,231
FEDERAL CIVILIAN	88,987
FEDERAL MILITARY	248,143
STATE AND LOCAL	131,101
 INCOME ADJUSTMENTS:	
TOTAL INCOME BY PLACE OF WORK	\$ 1,340,927
LESS FICA CONTRIBUTIONS	52,776
NET INCOME BY PLACE OF WORK	1,288,151
PLUS RESIDENCE ADJUSTMENT	-23,903
NET INCOME BY PLACE OF RESIDENCE	1,264,248
PLUS DIVIDENDS, RENT AND INTEREST	295,883
PLUS TRANSFER PAYMENTS	246,045
PERSONAL INCOME BY RESIDENCE	1,806,176
PER CAPITA (dollars)	6,791
POPULATION (persons)	265,949

SOURCE: CONSTRUCTION ENGINEERING RESEARCH LABORATORY

2. Income Distribution

The per capita income of Monterey County in 1974 was \$6,312, having grown at an 8% annual rate from 1969. At the same time the median family income was \$ 9,729. In 1970 family income for the 57,100 families in the county was distributed such that 9.6% were below the then existent poverty level and 14% were below 125% of the poverty level. During the same period 20.8% of the families reported incomes over \$15,000 [Ref. 22]. By 1976 per capita income for the county had increased to \$ 7,063 very close to the state average of \$ 7,030 [Ref. 21:221]. Ten percent of the 1976 83,332 households in the county reported incomes of less than \$4,000 with an additional 12 % in the \$4-7,000 range, and 13% in the \$7-10,000 range. The Employment Development Department projected that 33,000 people would be below the poverty level in 1980 [Ref. 6:61].

D. PERSONAL EXPENDITURE

1. Retail Sales

For 1978, consumers purchased taxable retail merchandise valued at \$ 887 million. The largest purchases (shown in Table IX) were made for general merchandise (\$ 137 million), new motor vehicles (\$ 131 million), eating and drinking out (\$ 119 million), gasoline and repair parts at service stations (\$ 95 million), and food (\$ 88 million). The trend in retail sales in the last five years has been

upward at an average annual rate of 12.66%. Retail sales climbed 17.2% in 1977 over 1976. Sales for each year are shown in Table X. Certain of the retail sales are attributed to the vast tourist influx which brought an estimated six million person/days of tourism in 1978 to Monterey and Santa Cruz counties. These visitors were estimated to spend \$100.1 million at eating and drinking establishments, \$ 9.7 million on groceries and liquor, \$ 9 million on recreation and entertainment, and other personal services of \$ 1.0 million. They also were estimated to spend \$ 84 million at apparel, general merchandise and specialty shops and \$ 16.6 million at retail service stations. These sales are shown in Table XI.

**TABLE IX
DISTRIBUTION OF RETAIL SALES
MONTEREY COUNTY 1978
(,000)**

BUSINESS:	TAXABLE SALES:
<hr/>	
RETAIL STORES:	
Apparel	\$ 55,163
General Merchandise	137,460
Specialty Stores	70,900
Food Stores	88,192
Food and Drink	119,705
Furniture	26,736
Appliances	14,582
Second Hand Appliances	742
Farm Implements	36,975
Farm and Garden Supply	5,383
Fuel and Ice	4,668
Lumber and Building Supply	39,005
Hardware	10,248
Plumbing and Electrical	1,132
Paint, Glass and Wallpaper	3,572
New Motor Vehicles	131,344
Used Motor Vehicles	9,095
Auto Supplies and Parts	24,588
Service Stations	95,779
Mobile Homes, Trailers and Campers	6,669
Boats, Motorcycles and Airplanes	5,085

TOTAL RETAIL STORES	\$ 887,025
Business and Personal Services	63,552
All other outlets	232,128

TOTAL TAXABLE SALES	\$ 1,182,705

**SOURCE:
MONTEREY PENINSULA CHAMBER OF COMMERCE**

**TABLE X
TAXABLE SALES MONTEREY COUNTY
HISTORICAL TREND
(,000)**

YEAR	SALES	% ANNUAL INCREASE
1973	\$ 488,775	
1974	544,260	11.3
1975	606,517	11.4
1976	677,845	11.7
1977	795,061	17.2
1978	887,025	11.5

**SOURCE:
MONTEREY PENINSULA CHAMBER OF COMMERCE**

TABLE XI
TOURIST RETAIL EXPENDITURES
MONTEREY COUNTY
1978

CATEGORY	EXPENDITURE (,000)
-----	-----
LODGING	\$ 58,400
EATING AND DRINKING	100,100
GROCERY AND LIQUOR	9,700
RECREATION AND ENTERTAINMENT	9,000
GASOLINE AND REPAIRS	16,600
RETAIL GOODS	84,100
PERSONAL SERVICES AND OTHER	1,000
-----	-----

SOURCE:
MONTEREY PENINSULA CHAMBER OF COMMERCE

2. Housing

The cost of housing on the Monterey Peninsula was among the highest in the country. Average sale prices of existing single family units in Monterey County ranged from \$ 75,000 to \$85,000 in 1977. In 1970 there were 76,022 housing units, 75.2% one unit dwellings and 52.5% owner occupied [Ref. 22]. By 1976 total housing units had increased to 92,960 with 66% in single units. (See Table XII). During the 1976 special census the effective vacancy rate was only 2.01% of the total housing unit inventory, indicating an extremely tight market (Table XIII). More than 45% of the housing stock was reported over 20 years old and 10 to 15% was in need of substantial health and safety of occupant repairs [Ref. 21:227]. Average rental for the 28,054 rental units was \$121 in 1970. (1970 Census)

**TABLE XII
MONTEREY COUNTY
HOUSING BY TYPE
1976**

TYPE -----	UNITS -----
Single Family	61,790
Duplex	4,957
Triplex	1,529
Fourplex	2,916
5-9 Units	5,438
10 and over units	7,071
Mobile Homes	5,702
Not Classified	3,557

TOTAL	92,960

SOURCE:
MONTEREY COUNTY PLANNING DEPARTMENT
NOTE: INCLUDES MILITARY FAMILY HOUSING UNITS

**TABLE XIII
MONTEREY COUNTY
VACANCY ANALYSIS BY MARKET AREA
1976**

AREA	UNITS	FOR SALE	FOR RENT	EFFECTIVE RATE %
N. Monterey County	6,991	75	40	1.77
Peninsula	46,832	319	679	2.13
South Coast	806	6	5	1.36
S. Monterey County	3,731	102	62	4.40
Gen. Salinas Valley	4,994	14	91	2.12
Toro	1,775	33	10	2.42
Greater Salinas	27,831	146	284	1.54
Total	92,960	693	1180	2.01

**SOURCE:
MONTEREY COUNTY PLANNING DEPARTMENT**

E. EMPLOYMENT

1. Employment And Work Force

Statistics on the civilian labor force are computed for the Salinas-Seaside-Monterey SMSA which is coexistent with Monterey County by the California State Employment Development Department. The trend in employment from 1974 to 1978 is detailed in Table XIV. Total civilian employment displayed significant growth in 1978, rising 4.8% above the 1977 average. The labor force however grew faster than employment adding an average of 500 workers to the unemployment rolls.

**TABLE XIV
CIVILIAN LABOR FORCE EMPLOYMENT AND UNEMPLOYMENT
MONTEREY COUNTY ANNUAL AVERAGES**

YEAR	LABOR FORCE	CHG %	EMPLOYED	CHG %	UNEMPLOYED	RATE %
1974	107500		100200		7,300	6.8
1975	109800	2.1	100300	.1	9,500	8.6
1976	113400	3.3	103300	2.9	10,100	8.9
1977	120000	5.8	110000	6.4	10,000	8.3
1978	125800	4.8	115300	4.8	10,500	8.4
1979	130200	3.5	119000	3.2	11,200	8.6
1980	134900	3.6	123600	3.9	11,300	8.4
1974- 1978		3.9		2.9		

1979, 1980 projected						

**SOURCE:
CALIFORNIA EMPLOYMENT DEVELOPMENT DEPARTMENT**

2. Occupational Categories

The wholesale and retail industry overtook the agricultural sector as the largest private sector employer in 1978 with 20.3% of the work force engaged. Agriculture accounted for 19.9%, followed in order of importance by the service industry, and manufacturing. Federal, state, and local governments continued as the largest employment sector in the county with 21.2 % of the work force (See Table XV). During the period from 1975 to 1980 the largest absolute changes in projected employment were in the service industry, followed by trade and manufacturing. The largest growth rates were recorded in mining, manufacturing and public administration employment, and the smallest growth in agricultural employment (Table XVI).

TABLE XV
EMPLOYMENT BY INDUSTRY
MONTEREY COUNTY
1972-1978
(THOUSANDS OF PERSONS)

INDUSTRY	1972	1973	1974	1975	1976	1977	1978
MINING	.5	.6	.7	.7	.6	.7	.6
CONSTRUCTION	2.9	3.1	3.2	2.7	2.8	3.3	3.6
MANUFACTURING	7.9	9.0	9.6	9.2	8.4	9.2	9.7
FOOD	3.9	4.3	4.3	4.2	3.8	4.1	4.1
TCPU	4.2	4.3	4.5	4.4	4.5	4.6	4.9
TRADE	16.3	17.3	17.5	18.0	18.9	20.1	21.4
FIRE	2.6	2.6	2.8	3.1	3.3	3.5	3.8
SERVICES	13.0	13.9	14.2	14.7	15.2	16.2	17.9
GOVERNMENT	18.9	19.3	20.3	21.2	21.7	22.8	22.4
AGRICULTURE	17.3	17.3	18.4	18.7	18.9	20.1	20.9
TOTAL	85.2	87.4	91.2	92.7	94.3	100.5	105.2

SOURCE:
CALIFORNIA EMPLOYMENT DEVELOPMENT DEPARTMENT

TABLE XVI
EMPLOYMENT BY INDUSTRY
ANTICIPATED CHANGES
MONTEREY COUNTY
1975-1980

INDUSTRY	EMPLOYMENT		CHANGE	RATE %
	1975	1980		
AGRICULTURE	12235	12583	348	2.8
MINING	647	839	192	29.6
CONSTRUCTION	3829	3954	125	3.3
MANUFACTURING	9582	12274	2692	28.0
TCPU	5055	5551	496	9.8
TRADE	23812	27089	3277	13.8
FIRE	3360	3765	405	12.0
SERVICES	29203	33282	4079	13.9
PUBLIC ADMIN	8238	9434	1196	14.5
TOTAL	95961	108771	12810	13.3

SOURCE:
CALIFORNIA EMPLOYMENT DEVELOPMENT DEPARTMENT

Service workers were anticipated to form the largest occupational group in 1980 with 17.4% of the labor force, followed by clerical workers (15.6%), professional and technical workers (14.4%), operatives (12.5%), and managers, officials and proprietors (10.3%). During the five year period from 1975 to 1980 it was anticipated that the largest absolute growth in occupational categories would be in clerical workers, followed by service workers and professionals (See Table XVII). Largest growth rates were noted for managers followed by clerical workers and service workers. The number of jobs for farmers and farmworkers declined 3.3% during the five year period.

**Table XVII
CHANGES IN EMPLOYMENT
BY OCCUPATION
MONTEREY COUNTY
1975-1980
ANTICIPATED**

OCCUPATION	EMPLOYMENT		CHANGE	RATE %
	1975	1980		
PROFESSIONAL,				
TECHNICAL	13,750	15,673	1923	13.9
MANAGERS	9,511	11,202	1691	17.8
SALES	6,885	7,974	1089	15.8
CLERICAL	14,429	16,994	2565	17.7
OPERATIVES	11,729	13,616	1887	16.0
SERVICE	16,597	18,891	2294	13.8
NON-FARM				
LABORER	3,602	3,994	392	10.8
FARMERS	9,643	9,323	-320	-3.3
TOTAL	95,961	108,771	12810	13.3

**SOURCE:
CALIFORNIA EMPLOYMENT DEVELOPMENT DEPARTMENT**

F. INDUSTRIAL OUTPUT

The largest industries of Monterey County were retail and wholesale trade in 1978 measured in terms of dollar volume. They were followed by agriculture and manufacturing. The largest type of manufactured products were agriculture related. Shipments from this type of manufacturing in 1972 were \$218.9 million. The basic industries in the economy are those which are conducted at least in part for export from the county, those which bring cash flows into the county. As discussed in Section C, the basic industries by order of importance were agriculture, manufacturing, retail and wholesale trade and services (See Table XVIII).

**Table XVIII
VALUE OF SALES OR SHIPMENTS
BY INDUSTRY
MONTEREY COUNTY**

SECTOR OR INDUSTRY	SOURCE YEAR	VALUE (\$ million)

PRESERVED FRUITS AND VEGETABLES	1972	61.7
SUGAR	1972	88.7
BEVERAGES	1972	8.8
OTHER FOOD	1972	59.7
APPAREL	1972	8.8
PRINTING AND PUBLISHING	1972	13.3
STONE CLAY GLASS	1972	37.9
MACHINERY	1972	17.9
OTHER INDUSTRY	1972	129.5
AGRICULTURE	1978	658.5
TRADE	1978	887.0
HOTEL AND MOTEL	1978	58.4
OTHER TAXABLE SERVICES	1978	63.5

SOURCES:

1972 CENSUS OF MANUFACTURES

1978 MONTEREY PENINSULA CHAMBER OF COMMERCE

G. FEDERAL AND STATE GOVERNMENT

Military personnel attached to Fort Ord are discussed in chapter V. Other impacts of federal activity in the county, as well as state activity, are caused by employment, subventions to local governments, direct purchases in the local economy, and retirement payments.

1. Employment

As noted in Table XV state, local and federal civilian workers in Monterey County have increased during the period 1972-1978 from 18,900 to 22,400. A more detailed classification of this employment is presented in Table XIX. The largest group within the civilian government sector is other state and local employees. These workers are primarily employees of school districts.

As a portion of overall government civilian employment, other state and local employees have increased from 46% to 53%. All but 400 of the increased employment in government has been in the schools and special districts, and 300 of the remaining 400 has been in local city employment.

Table XIX
STATE, LOCAL AND FEDERAL
GOVERNMENT EMPLOYMENT
CIVILIANS
1972-1978
(THOUSANDS)

YEAR	FEDERAL TOTAL	FORT ORD	COUNTY	CITY	OTHER	TOTAL
1972	6.5	3.2	2.4	1.3	8.7	18.9
1973	6.5	3.2	2.5	1.3	.0	19.3
1974	6.5	3.2	2.7	1.4	9.7	20.3
1975	6.6	3.1	2.5	1.5	10.6	21.2
1976	6.5	2.6	2.6	1.6	11.0	21.7
1977	6.7	2.7	2.7	1.7	11.7	22.8
1978	6.4	2.7	2.6	1.6	11.8	22.4

SOURCE:
CALIFORNIA EMPLOYMENT DEVELOPMENT DEPARTMENT
FORT ORD ENVIRONMENTAL IMPACT REPORT

2. Subventions and Revenue Sharins

a. State Subventions

State assistance was provided to cities and counties by statute on the basis of population within the jurisdiction. The sources of this state assistance based on population were the Motor Vehicle License fee, the highway users (gasoline) tax, the off-highway motor vehicle license fee, and the cigarette tax. In addition to these sources, cities and counties were permitted to levy a 1% sales tax which is collected and rebated by the state [Ref. 21:181]. The method of determining the subvention is shown in Table XX. The state subventions provided revenues to cities and to Monterey County of an estimated \$10.6 million in 1978-1979. Details of payments estimated for each city and the county are provided in Table XXI.

TABLE XX
STATE SUBVENTIONS TO
CITIES AND COUNTIES
1978-1979

TAX TYPE	SUBVENTION TO	RATE

MOTOR VEHICLE LICENSE	CITY	\$13.24 P/C
	COUNTY	\$11.08 P/C
HIGHWAY USER SEC 2106c	CITY	\$3.199 P/C
2107	CITY	\$4.48 P/C
2107.5	CITY	varies
OFF HIGHWAY VEHICLE	CITY	\$.014 P/C
	COUNTY	\$.0119 P/C
HIGHWAY CARRIER	CITY	\$.131 P/C
	COUNTY	\$.1095 P/C
CIGARETTE TAX	CITY	\$2.00 P/C
SUMMARY	CITY	\$23.064 P/C
	COUNTY	\$11.2014 P/C

SOURCE:
FORT ORD ENVIRONMENTAL IMPACT REPORT
NOTE -RATES SHOWN ARE PER CAPITA (P/C)

**TABLE XXI
STATE SUBVENTIONS
TO CITIES AND COUNTIES
1978-1979
ESTIMATED**

CITY	POPULATION	SUBVENTION
CARMEL	4761	\$ 109,807.70
DEL REY OAKS	1543	35,587.75
GONZALES	2663	61,419.42
GREENFIELD	3585	82,684.44
KING CITY	5326	122,838.86
MARINA	19411	447,695.30
MONTEREY	27399	631,930.53
PACIFIC GROVE	16358	377,280.91
SALINAS	77761	1,793,479.70
SAND CITY	190	4,382.16
SEASIDE	34343	792,086.95
SOLEDAD	5557	128,166.95
MONTEREY COUNTY	277464	3,107,985.25
TOTAL		7,695,345.63

**SOURCE :
AUTHOR**

b. Revenue Sharing

Federal general revenue sharing provided California cities and counties with \$478 million in 1976-1977. Revenue sharing is determined by a series of formulas at the state and 'county area' level involving three factors: population, tax effort and per capita income. The complexity of the revenue sharing formula prevents attributing specific dollars on a per capita basis [Ref. 21:181].

c. Federal Impact Aid

Direct federal assistance to school districts in lieu of local property taxes was provided where significant concentrations existed of certain federal employees. In 1976-1977, school districts in Monterey were recipients of federal impact aid to schools. Details of the receipts to each school district are shown in Table XXII.

3. Transfer Payments

Direct payments to individuals by the federal government, or by the state took the form of military retirement, social security, and public assistance. Military retirement benefits for an estimated 9,000 annuitants were estimated at \$ 54 million [Ref. 21:224]. In 1976 social security benefits were paid to 31,776 persons and totaled \$72.2 million [Ref. 6:63]. (1975 social insurance payments by workers were \$ 52.8 million)

Unemployment benefits were paid in 1978 to an average of 10,500 persons per month. Public assistance was payable to 12,202 food stamp recipients, 158 for general home relief, 293 children in foster family homes, 37 children in institutions, and 5,250 recipients of Aid to Families with Dependent Children [Ref. 6:64]. Total transfer payments in 1975 were \$ 246 million.

4. Direct Federal Purchases

While total direct procurement by federal activities is not known, the major federal activity was the military. During FY 1978 direct procurement by military activities in the county from vendors within the county was \$76.2 million [Ref. 21:192]. Construction services purchased by military activities were valued at an additional \$ 9.3 million [Ref. 21:192].

**TABLE XXII
FEDERAL IMPACT AID TO SCHOOLS
MONTEREY COUNTY
1976-1977**

SCHOOL DISTRICT	AID
MONTEREY PENINSULA UNIFIED	\$4,339,335.
SAN ANTONIO UNION	70,000.
WASHINGTON UNION	31,557.
CARMEL	177,919.
PACIFIC GROVE	158,334.
SOLEDAD UNION	53,530.
GONZALES UNION	22,750.
SALINAS CITY	167,157.
NORTH MONTEREY	95,486.
ALISAL UNION	42,157.
SANTA RITA UNION	20,399.
SALINAS HIGH SCHOOL	80,755.
KING CITY	2,232.
KING CITY HIGH SCHOOL	15,685.
MONTEREY COUNTY	18,490.
MONTEREY PENINSULA COLLEGE	42,779.
HARTNELL COLLEGE	58,113.
TOTAL	\$5,396,698.

**SOURCE:
FORT ORD ENVIRONMENTAL IMPACT REPORT**

V. THE FORT ORD SECTOR

"The economy of the Monterey Peninsula is based primarily on military payrolls..." [Ref. 17:11]

These words written by the Monterey Peninsula Chamber of Commerce emphasize the perception of the Fort Ord sector held by the community in which it is situated. The military industry Fort Ord constitutes is described in this chapter. The location, population, demography, income characteristics, consumption patterns (personal and institutional), employment demand, and provision and consumption of government services are presented in separate sections. Relationships to the broader community are established in the appropriate sections.

A. LOCATION AND GEOGRAPHY

Fort Ord is located directly on Monterey Bay, seven miles northeast of the city of Monterey. The post is bounded on the north by the city of Marina, on the east by El Toro creek and on the south by the cities of Seaside and Del Rey Oaks [Ref. 21:60]. The Fort occupies 28,016 acres. This area represents 1.3% of the total land area of the county, and nearly 90% of incorporated urban areas of the county. The topography varies from coastal sand dunes to rolling hills inland. Approximately 21% of the Fort's land area was leased in 1978 for grazing by sheep.

B. POPULATION

The population growth and distribution of Monterey County has been greatly influenced by Fort Ord. Nearly all military personnel and their families attached to Fort Ord live within Monterey County [Ref. 21:229]. While the population of Monterey County has grown by 10% or 1.5% per year during the period 1970-1976, when the population on Fort Ord is excluded the county population increase is a more dramatic 14.9% or 2.2% per year. The Monterey peninsula area includes Fort Ord, Marina, the Peninsula cities (Seaside, Del Rey Oaks, Monterey, Pacific Grove), Del Monte Forest, Carmel, Carmel Valley, and adjacent areas. This area is even more heavily influenced by Fort Ord than is the county. The Fort Ord population represented 25% of the peninsula population in 1970 and 19% in 1976. Because of the net decline at Fort Ord of 7471 (23%) in the six year period, the area population declined .2%. When the peninsula population for the period is examined exclusive of Fort Ord, real growth of 7.3% occurred. The remainder of the county, outside the peninsula area, grew at an even more considerable rate of 3.0% per year or 21.3% for the period. Since 1976, on-base population has continued to fall to an estimate for June 1978 of 19,736 consisting of 11,085 military personnel and 8,651 military dependents.

**Table XXIII
AREA POPULATION GROWTH
MONTEREY COUNTY
1970-1976**

AREA	1970	1976	Change	CHG %	CHG %/YR
MONTEREY COUNTY	247,450	272,097	24,647	10.0	1.5
MONTEREY COUNTY WITHOUT FT ORD	215,322	247,440	32,118	14.9	2.2
PENINSULA AREA	130,123	128,809	-314	-.2	0
PENINSULA AREA WITHOUT FT ORD	97,995	105,152	7,157	7.3	1.1
PENINSULA AREA: (FORT ORD SEPARATE)					
FORT ORD	32,128	24,657	-7,471	-23.3	-
MARINA	9,715	12,098	2,383	24.5	3.4
PENINSULA CITIES	65,029	65,911	882	1.4	.2
DEL MONTE FOREST	3,908	4,849	941	24.1	3.4
CARMEL+ADJACENT	9,379	9,131	-248	-2.6	-.4
CARMEL VALLEY	6,900	9,274	2,374	34.4	4.7
CARMEL HIGHLANDS	689	739	50	7.3	1.1
COAST	898	1,727	829	92.3	10.6
AREA BALANCE	1,477	1,423	-54	-3.7	-.6

Source:
Monterey County Planning Department

1. Military Population in Surrounding Communities

The cities of Seaside and Marina are the most affected by the population of Fort Ord. The city limits of these two cities are drawn through the Fort dividing the on base population between the two cities. Besides those military personnel and dependents included within the limits of these cities and living on post, 44% of the off-post military population live in Seaside and Marina. In Seaside in 1976 the military related population on and off post constituted 50.4% of the total city population. The off-post military related population was 16.4% of the total in Seaside. For Marina the military represented 61% of the city population, and those living off base were 26.6% of the Marina population. Other cities with significant military and dependent populations include Salinas, Monterey, and Pacific Grove. Table XXIV shows the residence in 1978 of military families assigned to Fort Ord and living off base. Table XXV compares the total 1976 population of the most impacted cities to the military and dependents on and off base population within those cities.

**TABLE XXIV
PLACE OF RESIDENCE
FORT ORD MILITARY PERSONNEL
16 JUNE 1976**

CITY	OFFICER	SENIOR ENLISTED	JUNIOR ENLISTED	TOTAL	%
SEASIDE	65	242	1038	1345	22.8
MARINA	271	230	785	1286	21.8
SALINAS	322	197	630	1149	19.5
MONTEREY	400	128	501	1029	17.4
PACIFIC GROVE	113	42	252	407	6.9
CASTROVILLE	14	22	60	96	1.6
OTHERS	104	108	374	586	10.0
TOTAL	1289	969	3640	5898	100.0

SOURCE:

FORT ORD ENVIRONMENTAL IMPACT REPORT

Note: PERCENT REFERS TO TOTAL MILITARY PERSONNEL IN THAT CITY

**TABLE XXV
MILITARY AND DEPENDENTS
RESIDENCE BY CITY
1976**

CITY	POPULATION	MILITARY AND DEPENDENTS	%
SEASIDE	34,360	17,332	50.4
MARINA	22,784	13,901	61.0
SALINAS	73,438	2,872	3.9
HONTEREY	27,841	2,573	9.4
PACIFIC GROVE	16,208	1,018	6.3

SOURCE:

Population, Monterey County Planning Dept
Military and Dependents, Author

2. Age Of The Military Population

The demographic characteristics of the military personnel at Fort Ord changed significantly after 1975 due to the change of mission of the Fort from basic training to the home of a division. This change affected the age, grade, and marital status of the post population. The basic training mission involved mostly very young first term soldiers who for the most part were unmarried or did not have their families with them. The transformation of the Fort to the home for a division caused an increase in the average age of the soldiers as more senior personnel replaced the recruits. Concomitantly, the number of families associated with the military population increased. The Army anticipates that the average age and grade of Army personnel will continue to rise before leveling off and that the trend in the Army toward later marriage and smaller families will continue [Ref. 21:214]. The elimination of Fort Ord military personnel and their dependents from the Monterey county population would not result in significant age group distribution change within the categories used in Table XXVI except for the group over 65. This is because the military and dependent population are found in nearly the same proportion as the county population except for the absence of those over 65 in the military and dependent population.

TABLE XXVI
POPULATION DISTRIBUTION BY AGE
MONTEREY COUNTY
1976

AGE	COUNTY WITH FORT ORD		FORT ORD		COUNTY WITHOUT FORT ORD	
	POP.	%	POP	%	POP.	%
0 To 15	63,398	23.3	12,421	32.5	50,977	21.8
15 To 64	186,659	68.6	25,637	67.4	161,022	68.8
OVER 64	22,040	8.1			22,040	9.4
TOTAL	272,097	100.0	38,058	100.0	234,049	100.0

Source:

Author

3. Racial Origin and Characteristics

The great majority of Monterey County residents and Fort Ord military personnel were classified caucasian. This group represented approximately the same proportion of the population for the military (63.7%) and for the county civilian population (68.4%). The distribution of persons depicted in Table XXVIII other than white, black or Mexican American was also roughly similar, 8.2% for Fort Ord military and 8.1% for the county civilians. The proportion of blacks in the military group is however substantially higher than the surrounding population, being 28.1% and 4.3% respectively. Black soldiers account for one out of every three blacks in the county, where white soldiers account for only about one of each fifteen whites. Mexican Americans are a significant group in the county. They comprise 19.2% of the county population.

4. Population In School

The school population of Monterey County in the fall of 1977 approximated 56,000 with 52,000 in public schools. Of these, 6,700 (nearly 12%) were estimated to be dependents of military personnel. Six thousand of the military related students were attending schools operated by the Monterey Peninsula Unified School District. Five public schools were operated on Fort Ord. No estimates were available for the

use of other educational facilities by military personnel however both the Monterey Peninsula College and Hartnell College receive Federal Impact Aid.

C. INCOME OF MILITARY PERSONNEL, CIVILIAN EMPLOYEES AND RETIREES.

1. Military Personnel

The gross annual military payroll at Fort Ord for 1978 was estimated at \$170,789,027. Only net payroll figures are available for any military base, and these figures are net of taxes, allotments, in-kind allowances and other deductions and do not reflect either true gross or net pay. For this reason gross military payroll was estimated. This estimate was arrived at by multiplying the personnel in each grade by the standard composite military pay rates. The average income of military families residing on the post was estimated at \$11,101 from military sources. This was 5% above the county average. For those families residing off post a somewhat higher income due to housing and subsistence allowances provided an average income from military pay of \$12,201, 15% above the county average. This distribution was skewed by the high salaries of the upper pay grades. More than 77% of the military personnel had incomes below the county average and 7% of these had incomes below \$7,000. Military incomes are not strictly comparable to civilian

incomes due to in-kind provision of commissary, exchange, medical, housing, subsistence and other benefits and differential tax treatment [Ref. 21:221].

2. Civilian Personnel

The 3,088 civilian personnel employed by Fort Ord appropriated and non-appropriated fund activities were paid in 1978 an estimated \$ 41,202,720. The average income of these civilian employees was \$16,094 or 149% of the county average family income [Ref. 21:225].

3. Retired Military

Payments to retired military personnel are made directly from central pay offices and not through the military activities. Estimates therefore of the number of personnel and their incomes is only approximate, but it was estimated that the 9,000 retirees believed living in the Monterey County area were paid gross retirement benefits of \$54 million dollars [Ref. 21:224].

D. PERSONAL EXPENDITURES OF MILITARY PERSONNEL

Ralph Anderson and Associates in 1978 conducted a study [Ref. 21:198] to determine consumer expenditures by Fort Ord military personnel from income earned at Fort Ord. The study methodology involved determining the gross military income of the military personnel by type, barracks personnel, families on post, and off post. Next allocation of personal

expenditures were made based on the U.S. Bureau of Labor Statistics 1976 four person urban living annual budget for income of \$10,000. The budget was adjusted by type of personnel (single, married on-base, married off-base) to correct for differences in food, housing, medical and social expenditures. On-post and off-post expenditures were estimated based on a California State study for the city of Seaside. The on-base spending portions were generally consistent with total gross volume at the Fort Ord commissary, post exchange, and liquor store. Expenditure by category are shown in Table XXVII. These military off-base food and drink expenditures represent for example 50% of the non-tourist related sales of eating and drinking establishments in the county. An additional \$40.14 million was channelled into similar purchases at on base commissary and post exchange stores.

TABLE XXVII
PROJECTED MILITARY EXPENDITURES
PERSONAL INCOME
LOCAL ECONOMY
FY 1978

CATEGORY	AMOUNTS (\$ million)
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GROSS INCOME	\$ 181.04

EXPENDITURES:

FOOD AND DRINK	41.12
CLOTHING	21.93
TRANSPORTATION	23.59
OTHER RETAIL	27.12

TOTAL	\$ 113.76
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OFF-BASE:

FOOD AND DRINK	18.35
CLOTHING	15.75
TRANSPORTATION	21.26
OTHER RETAIL	18.33

TOTAL	\$ 73.69
-------	----------

SOURCE

FORT ORD ENVIRONMENTAL IMPACT STATEMENT

E. EMPLOYMENT IN THE CIVILIAN SECTOR

Fort Ord affects civilian employment in three ways. First it is a direct employer of civilian personnel. In 1978, 2695 persons were employed by Fort Ord as civilian appropriated fund employees. This made Fort Ord the largest single civilian employer in the county.

Fort Ord also provides part of the civilian work force of the county through the participation of military dependents and military personnel off duty in the work force. A study done for the Army by the SWA Group in 1978 found that in 1977, 27% of the spouses of military personnel worked full time and an additional 14% worked part time [Ref. 21:216]. No details were available on the number of military personnel who were employed part time in off duty hours.

The third effect of Fort Ord on the civilian employment is through the employment multiplier. Some of the civilian jobs in the community exist to serve the needs of those military and civilian personnel employed by Fort Ord. This multiplier effect is further discussed in Chapter VI.

F. MILITARY CONTRIBUTIONS TO LOCAL GOVERNMENT REVENUE

1. State Subventions

State assistance to cities and counties on a per capita basis is discussed in Chapter IV. Because these subventions are attributable on a per capita basis, a

significant portion of those revenues were attributable to the military personnel and dependent population. For the cities of Seaside and Marina the subventions held extra significance. Both cities share the on base military population in their population base because the city limits include portions of Fort Ord. For this reason 41% of the Seaside subvention (\$402,235.82) was the result of the presence of the military population, as was 47% of the assistance to Marina (\$273,094.13), even though this population resided on a military reservation. The subventions are detailed in Table XXVIII.

TABLE XXVIII
STATE SUBVENTIONS TO CITIES AND COUNTIES
MILITARY RELATED
1978-1979

CITY OR COUNTY	SUBVENTION	MILITARY RELATED
SEASIDE	\$ 798,086.95	\$ 402,235.82
MARINA	447,695.30	273,094.12
SALINAS	1,793,479.70	69,945.70
MONTEREY	631,930.53	59,401.46
PACIFIC GROVE	377,280.91	20,618.69
COUNTY	3,107,985.25	379,290.60

SOURCE:
Author

2. Federal Impact Aid

In 1976-1977, \$5,339,569 was provided to school districts in Monterey County under the Federal Impact Aid Program. The amounts paid to individual school districts for the 1976-1977 school year is detailed in Table XIX. The most affected school district was the Monterey Peninsula Unified School District which received 80% of the aid for the approximately 6,000 military dependents attending school in that district. The dependents were 13% of the school district population and the impact aid was 15.8% of total district revenue and 47.3% of local property tax revenue [Ref. 21:181].

3. Sales Tax Revenue from Military Sources

a. Sales Tax Revenue from Military Personal Spending

Personal expenditures for retail purchases for Fiscal year 1978 were estimated, excluding gasoline sales at \$49.08 million [Ref. 21:184]. The county and cities shared sales tax revenue with the state, in the ratio of 1 to 5 for cities and county. Based on the estimated personal expenditures for retail items, city and county governments were estimated to receive \$490,800 in sales tax revenue during that year from the expenditures of military families.

b. Sales tax revenue from direct procurement

The federal government contracts with private contractors to undertake military construction projects. A study by Ralph Williams and Associates [Ref.21:185] found that an average 38.5% of the contract price for military construction projects was spent for materials procured locally. When the contractor procures the material the sale is subject to sales tax. Thus cities and counties realize sales tax revenue of \$0.385 for each \$100 dollars of construction contracts. Sales tax revenue to all county governments from this source and construction payments are shown in Table XXIX.

**TABLE XXIX
SALES TAX REVENUES ON
CONSTRUCTION PAYMENTS
MONTEREY COUNTY
FY 1976-1979**

FY	CONSTRUCTION PAYMENTS (\$ MILLIONS)	TAX REVENUE (\$)
76	23.04	88,700
77	27.58	106,190
78	12.00	46,200
79	8.55	32,910

**SOURCE:
FORT ORD ENVIRONMENTAL IMPACT REPORT**

VI. ANALYSIS OF MONTEREY COUNTY ECONOMY

This chapter will examine aspects of the economy of Monterey County and the Fort Ord sector described in Chapters IV and V. the methods of analysis used will be described prior to their application. Industry for the purposes of this analysis should not be just thought of in terms of productive enterprise as in machinery manufacturing or food processing. Rather it applies more generically to all sectors of the economy which employ people or earn income. Employment and income are aspects of the same process. To the extent that productivity remains relatively stable over time, employment growth becomes synonymous with growth in real income.

As discussed in Chapter II the methodologies chosen for analysis of the county economy are known as shift share analysis, and location quotient derivation of employment and income multipliers. The income and employment multiplier derivation will be discussed in Chapter VII.

Shift share analysis and location quotient derivations both deal with the relative importance of a region's industries compared to the national economy. They provide a vehicle for examining the composition of a region's industries and analyzing that composition in relative rather than absolute terms.

Shift share analysis identifies and highlights differential growth of a region from the national economy by industry, industrial composition, and regional share. The location quotient provides additional capacity for predicting the impact of composition changes.

A. THE SHIFT SHARE ANALYSIS CONCEPT

1. Classical Shift Share Analysis

Shift share analysis in the classical sense is designed to separate total growth of employment, income or output in a region into growth components. These growth effects or components allow analysis of the difference in growth between regions. The recognized components of classical shift share analysis are change in total national employment (national growth), change in relative employment between industries (industry mix), and the relative share of an industry in a region compared to the total industry (industry share) [Ref. 11:441].

2. A Shift Share Analogy

To provide a simple example of shift share terminology a sports analogy is provided. The total growth in attendance at all sporting events is called the national growth factor. The industry mix factor would be the proportion of total attendance at football games compared to all other sporting events. The industry share factor would

be attendance at Oakland Raiders games compared to all football games. Thus shift share analysis would account for change in attendance at Oakland Raiders games separating the change into components of change in national sports attendance, change in football game attendance, and change in Raider vice other football team attendance. The three components will be designated national growth, industry mix and regional share respectively.

3. Other Effects and Problems

A fourth effect described as allocation effect by Estiban-Marquillas [Ref. 9:249-255] attempted to separate more carefully the industry mix and regional share. It separated out the growth in a region that would have occurred in the regional share if the industry mix was the same as the national industry mix. This fourth component of change was found to be a useful tool in determining the significance of industry mix on a region in a study of 34 employment sectors (industries) in 173 economic areas undertaken by Herzog and Olsen [Ref. 11:1977]. A problem with either the three or four effect approach is the sensitivity of both approaches to changes in the use of labor (the relative productivity) in individual industries in the time periods studied [Ref. 11:453].

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B. SHIFT SHARE ANALYSIS OF THE MONTEREY COUNTY ECONOMY

1. The Shift Share Formula

The regional shift share formula was given and described by Herzos and Olsen [Ref. 11:442] and Bendavid [Ref. 2:453-85] but will be restated to provide clarity. Employment change has been chosen as the growth surrogate based on the theoretical considerations described above and on the availability of reliable data. The basic relationship utilized is:

$$R = N + M + S + A$$

where R is total change in regional employment in an industry, N is the total change in employment in industry in the region due to change in total national employment, M is the total change in regional industrial employment due to greater national industry change than change in total national employment, S is the change in employment due to change in industry employment in the region compared to industry employment in the nation if the industry mix in the region was the same as the industry mix in the nation, and A is the change in employment due to change in industry employment in the region compared to industry employment in the nation less the share effect based on industry mix. The formula derivation stated more formally is:

- (1) $R = N + M + S + A$
- (2) $R_{iJ} = N_{iJ} + M_{iJ} + S_{iJ} + A_{iJ}$
- (3) $R_{iJ} = f_{iJ} - b_{iJ}$
Where f_{iJ} is final regional industry employment and b_{iJ} is beginning regional industry employment
- (4) $N_{iJ} = (b_{iJ}) ((f_c - b_c) / (b_c))$
Where f_c is final national employment and b_c is beginning national employment.
- (5) $M_{iJ} = (b_{iJ}) [((f_{ic} - b_{ic}) / (b_{ic})) - ((f_c - b_c) / (b_c))]$
Where f_{ic} is final national industry employment and b_{ic} is beginning national industry employment
- (6) $S_{iJ} = (b_J(b_{ic}/b_c)) [((f_{iJ} - b_{iJ}) / (b_{iJ})) - ((f_{ic} - b_{ic}) / (b_{ic}))]$
- (7) $A_{iJ} = [((b_{iJ}) - (b_J(b_{ic}/b_c)))]$
 $\times [((f_{iJ} - b_{iJ}) / (b_{iJ})) - ((f_{ic} - b_{ic}) / (b_{ic}))]$
- (8) $f_{iJ} - b_{iJ} = N_{iJ} + M_{iJ} + S_{iJ} + A_{iJ}$
- (9) $f_{iJ} - b_{iJ} = (b_J) ((f_{ic} - b_{ic}) / (b_c))$
 $+ (b_{iJ}) [((f_{ic} - b_{ic}) / (b_{ic})) - ((f_c - b_c) / (b_c))]$
 $+ (b_J(b_{ic}/b_c)) [((f_{iJ} - b_{iJ}) / (b_{iJ})) - ((f_{ic} - b_{ic}) / (b_{ic}))]$
 $+ [((b_{iJ}) - b_J(b_{ic}/b_c))] [((f_{iJ} - b_{iJ}) / (b_{iJ})) - ((f_{ic} - b_{ic}) / (b_{ic}))]$
- (10) $R_{iJ} = (N_{iJ} + M_{iJ} + S_{iJ} + A_{iJ})$

2. The Sectors To Be Analyzed

Shift share analysis, to be effective, must examine all sectors of the economy. The main decisions are in choosing the number of sectors to partition the economy into, and the level of disaggregation to be applied to the economy. The decisions are influenced by two major considerations. The first consideration is the importance to the economy of the detailed industries. The second and perhaps more restraining consideration is the availability of disaggregated data at the desired level of detail.

For the analysis of Monterey County economy fourteen total sectors were chosen. Some industries were not disaggregated but three, manufacturing, government, and trade were selected for more detailed presentation and treatment. The manufacturing industry was separated into

two and then three sectors. The first two were durable and non-durable goods. Non-durable goods were further divided into food processing and non-durable manufacturing other than food processing. The government industry was divided into federal civilian, federal military, and state and local government sectors. The trade industry was decomposed into the wholesale and retail trade sectors. The sources of data for the sectors to be analyzed are shown in Table XXX. The time period chosen for the analysis was selected to be as current as possible with available data and short enough to minimize structural change. Accordingly the time period used was 1972-1977.

TABLE XXX
SHIFT SHARE SECTORS
AND DATA SOURCES
(WITH ABBREVIATIONS)

INDUSTRY	REGIONAL SOURCE	NATIONAL SOURCE
MINING	A	C
CONSTRUCTION (CONSTRUC)	A	C
DURABLE GOODS MANUFACTURING (DUR MFG)	A	C
NON-DURABLE GOODS MANUFACTURING LESS FOOD AND KINDRED GOODS MANUFACTURING (NON DUR MFG)	A	C,D
FOOD AND KINDRED	A	D
TRANSPORTATION ,COMMUNICATIONS, AND PUBLIC UTILITIES (TCPU)	A	C
FINANCE INSURANCE AND REAL ESTATE (FIRE)	A	C
SERVICES	A	C
FEDERAL MILITARY (FED MIL)	B	F
FEDERAL CIVILIAN (FED CIV)	A	C
STATE AND LOCAL (STATE+LO)	A	C
AGRICULTURE (AGRI)	A	E

SOURCES:

- A- WAGE AND SALARY EMPLOYMENT BY INDUSTRY
SALINAS-SEASIDE-MONTEREY METROPOLITAN AREA
1972-1978 CALIFORNIA EMPLOYMENT DEVELOPMENT DEPT.
- B. ECONOMIC IMPACT FORECAST SYSTEM
CONSTRUCTION ENGINEERING RESEARCH LABORATORY
- C- BULLETIN 2000 HANDBOOK OF LABOR STATISTICS 1978
US DEPT OF LABOR TABLE 42
- D- HANDBOOK OF LABOR STATISTICS TABLE 43
- E- HANDBOOK OF LABOR STATISTICS TABLE 49
- F- STATISTICAL ABSTRACT OF THE US 1978
TABLE 605

3. The Shift Share Tables for Monterey County

a. The Employment Change Table

Table XXXI describes the change in national and Monterey County employment between 1972 and 1977 on an absolute and percentage basis. Readings across the Retail trade line (RETAIL), 1972 employment in the nation was 12.0 million, and 13.9 million in 1977. The industry employed 1.9 million additional workers in 1977 then in 1972 which was an increase of 15.8 %. In Monterey County, the retail trade grew from a 1972 employment of 13,600 to a 1977 level of 17,500 a gain of 3,900 or 28.7% for the period.

Examination of the national industry shows that on a percentage basis the industries with increases were led by mining followed by services, state and local government and retail sales. All industries except agriculture, the military, construction, non-durable goods manufacturing, and federal civilian showed growth. Construction, non-durable goods manufacturing and federal civilian employment registered no growth, and the military and agriculture industries registered decreases in employment.

Based on absolute employment, the nation had 7.2 million net jobs more in 1977 than 1972. Forty percent of these new jobs were accounted for by the service industry, 26% by the retail trade and 25% by state and local governments.

In the Monterey County economy the fastest growing industries on a percent growth basis were mining, finance insurance and real estate, non-durable manufacturing, and state and local government. Only two sectors showed percentage declines, wholesale trade and military. In terms of absolute employment, employment increased by a net of 8,700 jobs. The new jobs were located primarily in retail trade, state and local government, services and agriculture.

TABLE XXXI
EMPLOYMENT CHANGE
MONTEREY COUNTY
1972 -1977
(County Employment ,000)
(National Employment ,000,000)

INDUSTRY	NATIONAL				MONTEREY COUNTY			
	1972	1977	CHG	CHG %	1972	1977	CHG	CHG %
CONSTRUC	3.8	3.8	0	0	2.9	3.3	.4	13.8
DUR MFG	11.0	11.5	.5	4.5	1.5	1.8	.3	20.0
NON DUR	6.4	6.4	0	0	2.5	3.3	.8	32.0
FOOD+	1.7	1.7	0	0	3.9	4.1	.2	5.1
TCPU	4.5	4.6	.1	2.2	4.2	4.6	.4	9.5
WHOLESALE	3.9	4.4	.5	12.5	2.7	2.6	-.1	-3.7
RETAIL	12.0	13.9	1.9	15.8	13.6	17.5	3.9	28.7
FIRE	3.9	4.5	.6	15.3	2.6	3.5	.9	34.6
SERVICES	12.4	15.3	2.9	23.4	13.0	16.2	3.2	24.6
FED CIV	2.7	2.7	0	0	6.5	6.7	.2	3.0
FED MIL	2.3	2.1	-.2	-8.7	27.2	19.0	-8.2	-30.0
STATE+LO	10.7	12.5	1.8	16.8	12.4	16.1	3.7	29.8
AGRI	4.4	3.3	-1.1	-25.0	17.3	20.1	2.8	16.2
MINING	.6	.8	.2	33.0	.5	.7	.2	40.0
TOTAL	80.3	87.5	7.2	9.0	110.8	119.5	8.7	7.9

SOURCE:
See TABLE XXX

b. The National Growth Effect

The national growth effect quantifies the number of Jobs in each industry in Monterey County which would have been created if each of the industries had grown at the national average rate of 9% between 1972 and 1977. In retail trade the Monterey County 1972 employment level was 13,600. If employment had grown in this sector by the 9% rate the number of new Jobs created would have been 1,224. Overall in the county 9,972 new Jobs would have been created. The number of new Jobs ascribable to national growth for each industry in Monterey County are portrayed in Table XXXII.

TABLE XXXII
NATIONAL GROWTH EFFECT
MONTEREY COUNTY
1972-1977

INDUSTRY	COUNTY EMPLOYMENT 1972 (,000)	N
CONSTRUCTION	2.9	261
DUR MFG	1.5	135
NON DUR MFG	2.5	225
FOOD + KINDRED	3.9	351
TCPU	4.2	378
WHOLESALE	2.7	243
RETAIL	13.6	1224
FIRE	2.6	234
SERVICES	13.0	1170
FED CIV	6.5	585
FED MIL	27.2	2448
STATE+LOCAL	12.4	1116
AGRICULTURE	17.3	1557
MINING	.5	45
TOTAL	110.8	9972

SOURCE:

AUTHOR

Note: National Growth Rate 9% x Col 1 = N

c. The Industry Mix Effect

The industry mix effect attempts to correct for the fact that national growth was not an even 9% in all industries but that this 9% was the average. The industry mix effect modifies the national growth effect for each industry by the deviation in industry growth rates in each industry from the national average. In retail trade, the national growth rate was 15.8 %. This was 6.8% above the national average of 9.0%. Accordingly an additional growth in this industry in the county can be attributed to the national mix of industries. This amount is the 6.8% deviation applied to the 1972 employment level or 925 Jobs.

The greatest deviation from the national average of 9.0% growth was recorded in agriculture where the deviation was -34%. Also showing major deviations were mining (+24%), the military (-17.7%), and services (+14.4%). When the calculated deviations are applied to the county industry employment levels of 1972, a net effect of -8321 Jobs is recorded. The effect calculations are displayed in Table XXXIII.

TABLE XXXIII
INDUSTRY MIX EFFECT
MONTEREY COUNTY
1972-1977

INDUSTRY	NATIONAL INDUSTRY GROWTH RATE	DEVIATION FM NAT'L GROWTH RATE	COUNTY EMPLOY 1972	INDUSTRY MIX EFFECT M
CONSTRUCTION	0	-9.0	2.9	-261
DUR MFG	4.5	-4.5	1.5	- 68
NON DUR MFG	0	-9.0	2.5	-225
FOOD +KINDRED	0	-9.0	3.9	-351
TCPU	2.2	-6.8	4.2	-286
WHOLESALE	12.8	+3.8	2.7	+103
RETAIL	15.8	+6.8	13.6	+925
FIRE	15.3	+6.3	2.6	+164
SERVICES	23.4	+14.4	13.0	+1872
FED CIV	0	-9.0	6.5	-585
FED MIL	-8.7	-17.7	27.2	-4814
STATE+LO	16.8	+7.8	12.4	+967
AGRICULTURE	25.0	-34.0	17.3	-5882
MINING	33.0	+24.0	.5	+120
TOTAL	9.0	0	110.8	-8321

SOURCE:
Author

d. Regional Share Effect

The regional share effect measures the proportion of jobs created by the industries in the region gaining a larger share of the total of their industry. To prevent this effect from being biased by the structure of industry in the county, the national industry structure is superimposed on county employment before the calculations are made.

In the Monterey County retail trade, the level of 1972 employment is adjusted to reflect the ratio of national retail trade employment to total national employment in 1972 (14.9%). This yields a hypothetical employment of 16,558 in the industry in 1972. The amount an industry at the regional level grew (or declined) in excess of the growth (decline) of the industry at the national level is then applied to the hypothetical employment to calculate the effect.

For the Monterey County retail trade, the growth from 1972 to 1977 was 28.7%. After subtracting the national retail trade growth rate of 15.8% the difference (12.9%) is applied to the hypothetical employment of 16,558 to yield a share effect of 2,136 jobs. Because in all but two sectors (wholesale trade and federal military) the county industries grew at a faster rate than their national counterparts, the share effect is quite large (+12,763). The calculations for each industry are shown in Table XXXIV.

TABLE XXXIV
REGIONAL SHARE EFFECT
MONTEREY COUNTY
1972-1977

INDUSTRY	NATL IND STRU	COUNTY IND W/NATL STRUC	COUNTY IND GROWTH RATE	NATL IND GROWTH RATE	DIFF	SHARE EFFECT
CONSTRUCTION	4.7	5243	13.8	0	+13.8	+ 724
DUR MFG	13.7	15178	20.0	4.5	+15.5	+ 2353
NON DUR MFG	8.0	8830	32.0	0	+32.0	+ 2826
FOOD+KINDRED	2.1	2346	5.1	0	+ 5.1	+ 120
TCPU	5.6	6209	9.5	2.2	+ 7.3	+ 453
WHOLESALE	4.9	5381	-3.7	12.8	-16.5	- 888
RETAIL	14.9	16558	28.7	15.8	+12.9	+ 2136
FIRE	4.9	5381	34.6	15.3	+19.3	+ 1039
SERVICES	13.3	17710	24.6	23.4	+ 1.2	+ 205
FED CIV	3.4	3726	3.0	0	+ 3.0	+ 112
FED MIL	2.9	3174	-30.1	-8.7	-21.4	- 679
STATE+LO	15.5	14765	29.8	16.8	+13.0	+ 1919
AGRICULTURE	5.4	6071	16.2	-25.0	+41.2	+ 2501
MINING	.7	828	40.0	33.0	+ 7.0	+ 58
TOTAL	100.0	110800	7.9	9.0	- 1.1	+12763

SOURCE: AUTHOR

e. The Allocation Factor

The regional share effect is modified by the allocation factor to correct for the fact that the county industries were not structured exactly like the nation. The difference between real and hypothetical 1972 employment in each industry is multiplied by the same differential growth rates used for the regional share effect to calculate the allocation effect.

In the Monterey County retail trade the difference (-2,958) between real 1972 employment (13,600) and hypothetical 1972 employment (16,558) is multiplied by the differential growth rate (+12.9%) to yield an allocation factor of -382 jobs.

When taken for all industries in the county the net effect is -5,826 jobs. This indicates that while industries in the county grew faster than their counterparts in the nation (large positive regional share effect) the county did not specialize in the ones that grew fastest and did specialize in industries that grew slower or declined and could not take full advantage of its competitive edge. The meanings of the allocation effect signs are discussed under analysis of shift share. The allocation effect for Monterey County is displayed in Table XXXV.

TABLE XXXV
ALLOCATION EFFECT
MONTEREY COUNTY
1972-1977

INDUSTRY	COUNTY IND EMPLOY	COUNTY IND W/NATL STRUC	COUNTY/ NAT'L IND GROWTH DIFF	ALLOCATION EFFECT
CONSTRUCTION	2900	5243	13.8	- 323
DUR MFG	1500	15178	15.5	- 2120
NON DUR MFG	2500	8830	32.0	- 2026
FOOD+KINDRED	3900	2346	5.1	+ 79
TCPU	4200	6209	7.3	- 147
WHOLESALE	2700	5381	-16.5	+ 442
RETAIL	13600	16558	12.9	- 382
FIRE	2600	5381	19.3	- 537
SERVICES	13000	17110	1.2	- 49
FED CIV	6500	3726	3.0	+ 83
FED MIL	27200	3174	-21.4	- 5142
STATE+LO	12400	14765	13.0	- 307
AGRICULTURE	17300	6071	41.2	+ 4626
MINING	500	828	7.0	- 23
TOTAL	110800	110800	- 1.1	- 5826

SOURCE: AUTHOR

As detailed in the general equation, $R_{ij} = N_{ij} + M_{ij} + S_{ij} + A_{ij}$. In the retail trade industry total employment change (R_{ij}) was 3900 from 1972 to 1977. The national growth component (N_{ij}) of this change was +1224, the industry mix component (M_{ij}) was +925, the regional share component (S_{ij}) was +2136 and the allocation effect (A_{ij}) was -382. (The sum of these component effects is 3903 vice 3900 due to roundings) The calculations for each industry and for the region as a whole are presented in Table XXXVI.

TABLE XXXVI
SHIFT SHARE ANALYSIS
SUMMARY
MONTEREY COUNTY
1972-1977

INDUSTRY	EMPLOYMENT CHANGE	NATIONAL GROWTH	INDUSTRY MIX	REGIONAL SHARE	ALLOCA. EFFECT
CONSTRUC	400	261	-261	+724	-323
DUR MFG	300	135	- 68	+2353	-2120
NON DUR MFG	800	225	-225	+2826	-2026
FOOD+KINDRED	200	351	-351	+ 120	+ 79
TCPU	400	378	-286	+453	- 147
WHOLESALE	-100	243	+103	- 888	+ 442
RETAIL	3900	1224	+925	+2136	-382
FIRE	900	234	+164	+1039	- 537
SERVICES	3200	1170	+1872	+ 205	- 49
FED CIV	200	585	-585	+ 112	+ 83
FED MIL	-8200	2448	-4814	- 679	-5142
STATE+LO	3700	1116	+967	+1919	- 307
AGRICULTURE	2800	1557	-5882	+2501	+4626
MINING	200	45	+120	+ 58	- 23
TOTAL	8700	9972	-8321	+12763	-5826

SOURCE:
AUTHOR

4. Analysis Of Shift Share

Herzos and Olsen [Ref. 11:445] described the possible allocation effects. These effects were coded and are summarized in Table XXXVII. The allocation effect signs are derived from Table XXXV. The specialization component of a particular industry in a region is positive (negative) when an industry in the region employs a greater (lesser) share of the total employment in the region than would exist if the region employed persons in the same structure as the nation. The competitive advantage component is positive (negative) when for an industry in a region, the growth rate was higher (lower) than for that industry in the nation. Code 1 represents an industry where the region was specialized but grew slower than the nation as a whole. Code 2 describes an industry which grew slower than the nation but in which the region did not specialize. Code 3 describes an industry which grew faster than the nation but which was not a specialty of the region. An industry which grew faster in the region and in which the region specialized is indicated by Code 4. The codes assigned to each industry and the signs for each effect are presented in Table XXXVIII.

TABLE XXXVII
POSSIBLE ALLOCATION EFFECTS

CODE	ALLOCATION EFFECT	COMPONENTS	
		SPECIALIZATION	COMPETITIVE ADVANTAGE
1	-	+	-
2	+	-	-
3	-	-	+
4	+	+	+

SOURCE: HERZOG AND OLSEN

TABLE XXXVIII
ALLOCATION EFFECTS
MONTEREY COUNTY

INDUSTRY	CODE	ALLOCATION EFFECT	SPECIALIZATION	COMPETITIVE ADVANTAGE
FED MIL	1	-	+	-
WHOLESALE	2	+	-	-
CONSTRUC	3	-	-	+
DUR MFG	3	-	-	+
NON DUR MFG	3	-	-	+
TCPU	3	-	-	+
RETAIL	3	-	-	+
FIRE	3	-	-	+
SERVICES	3	-	-	+
STATE+LO	3	-	-	+
MINING	3	-	-	+
FOOD	4	+	+	+
FED CIV	4	+	+	+
AGRICULTURE	4	+	+	+

SOURCE: AUTHOR

5. Shift Share Analysis For Monterey County

For the county, competitive advantage existed in all industry sectors except for the federal military and the wholesale trade. In the federal military county employment declined faster than in the nation, while in wholesale trade, county employment declined while national employment was rising. The effect on county employment of the two industries was different because while the county did not specialize in the wholesale trade, it did specialize in the military. Therefore, the military decline was dramatic in its effect. The industry declined at a faster rate in the county than the nation and the industry was a specialty of the county.

Of the remaining industries for which the county retained a competitive advantage, the benefits of specialization accrued only to three, the food processing industry, the federal civilian sector, and agriculture. All other industries in which the county had a competitive advantage were industries in which the county did not specialize. These effects are portrayed in Table XXXVIII.

For the county the summary line in Table XXXVI shows that as a region 8700 new jobs were created between 1972 and 1977. If only national growth (9972) and national industry growth (-8321) had influenced county employment, then just

1,651 new Jobs would have existed. The increased competitive edge of the county (+12,763) when adjusted by its lack of specialization in many industries (-5826) accounted for the additional (+6937) Job increase.

The effect of each component of change on the industries selected for analysis is discussed in the following paragraphs. The data supporting the discussion is provided in Table XXXVI.

a. Construction Industry

In the county this industry had an employment change of 400 between 1972 and 1977. The national growth effect (+261) is cancelled by the industry mix effect (-261) because the industry did not grow nationally. The four hundred additional Jobs are due to the county industry acquiring a greater share of the national construction industry than it previously had (+724 Jobs) modified by the county's non-specialization in construction (-323 Jobs).

b. Durable Goods Manufacturing

Three hundred more Jobs existed in the Monterey County durable goods manufacturing industry in 1977 than in 1972. National growth and industry growth in the national industry together account for 67 of these Jobs. The remainder (233) are due to increasing concentration of this industry in this county (+2353) reduced by the lack of specialization (-2120).

c. Non-durable Goods Manufacturing Less
Food Processings

This industry did not experience any national growth. If the county had specialized in this industry or at least had employment in the industry in the same proportion as the nation, the county's competitive advantage could have resulted in 2826 new Jobs. Lack of specialization reduced this to 800 (2826-2026).

d. Food Processings

Food processings is a specialty of the county and it is one in which the county also maintains a competitive advantage. This advantage and specialty accounted for all of the increase of 200 Jobs because there was no growth in the industry in the nation.

e. Transportation, Communications and Public
Utilities

In this industry the county employment increased by 400 Jobs. National growth (378) combined with the slower than average national industry growth (-286) accounted for 92 of the 400 new Jobs. The remainder were accounted for by increasing concentration in the county of this industry's national employment (+453) reduced by the lack of specialization of the industry in the county (-147).

f. Wholesale Trade

In the nation wholesale trade employment increased even faster than national growth. Together these two effects should have created 346 new Jobs in the county (243+103).

The county however did not have a competitive advantage and lost employment in this industry to other regions (-888). This loss was reduced because of the lack of specialization by the county in the industry (+442)

g. Retail Trade

Retail trade grew vigorously between 1972 and 1977 in Monterey County, increasing by 3900 Jobs, more than any other industry. National growth in employment would have accounted for 1224 of these Jobs, while the increased growth in the national retail trade accounted for an additional 925 Jobs. The combination of competitive advantage and some specialization provided the remaining 1851 Jobs. This may be interpreted to mean that an increasing share of the retail goods consumed in the county were purchased within the county.

h. Finance, Insurance and Real Estate

Nine hundred additional Jobs existed in the Finance Insurance and Real Estate industry of Monterey County in 1977 than in 1972. National growth accounted for 234 of these Jobs. An additional 164 are accounted for by the faster than average growth of this industry in the nation. Growth in this industry in the country was even faster than industry national growth and would have created an additional 1039 Jobs but lack of specialization reduced this growth by 537 Jobs.

i. Services

The growth in service industry employment in the county of 3,200 jobs was primarily attributable to national expansion of employment generally and of this industry in particular. The 9% general national employment growth would have accounted for 1,170 jobs, and national services industry growth an additional 1,872 jobs. The remaining higher growth in the county services industry 156 jobs are accounted for by slightly faster county industry growth (1.2%) compared to the national service industry.

j. Federal Civilian Employment

The federal civilian government payroll in the nation remained unchanged from its 1972 level in 1977. Nevertheless the county was able to attract 200 federal jobs during the period. The jobs can be allocated to increasing competitive edge in the county (112 jobs) and to increased specialization (83 jobs).

k. The Military

As previously stated the military account for a large portion of total county employment and this industry is a specialty of the county. The national reduction in active duty military personnel between 1972 and 1977 would have accounted for 2,366 of the 8,700 jobs lost to the county. The county however lost military jobs at a faster rate than the nation accounting for a loss of an additional 679 jobs. The county specialization in the industry accounted for the remainder (5,142) lost jobs.

1. State and Local Government

If state and local government employment had expanded in the county at the 1972-1977 average national growth rate, county, state and local government employment would have increased by 1,116 Jobs. The rapid increase in this sector of the national economy would account for an additional increase of 967 Jobs. When the adjustment for specialization (-307) is made to the regional share effect of 1,919 the county attracted a greater share of the new state and local government Jobs then accounted for by industry growth alone. This competitive edge provided an additional 1,612 new Jobs.

m. Agriculture

If agricultural employment in Monterey County had mirrored its national counterpart, this industry would have employed 4,325 fewer persons in 1977 than in 1972. The competitive advantage of the county agricultural industry overcame this influence and provided instead an increase of 2,501 Jobs. The specialization in agriculture which the county enjoys accounted for the remainder of the growth by providing growth of 4,626 Jobs. Taken together the industry employed 2800 more persons in 1977 than in 1972.

n. Minins

Although minins is a very small sector in both the nation and the county, national and national industry growth would have provided 45 and 120 Jobs respectively. The slight competitive advantage of the county minins industry (+58) overcame its lack of specialization (-23) to provide the remainins 35 Jobs.

VII. MULTIPLIER EFFECTS

The direct or initial impact of an employment or income change is the change itself. Where such a change induces further changes in employment or income, the impact of the initial change can be said to have been multiplied. The total effect is the sum of the direct and induced changes. Hence, the total change is some multiple of the direct change. This multiple is called the multiplier.

A. THE MULTIPLIER AND ECONOMIC BASE THEORY

Economic base theory divides an economy in a region into two major sectors, basic and non-basic. The basic sector contains those industries which derive their demand outside the region. The non-basic sector contains industries whose demand comes from within a region. The theory further supposes that a change in external demand affects the basic industries directly, and more importantly also causes an indirect or induced change in the non-basic industries. If the measure of activity in a region is employment, an increase in demand for a basic industry will cause increased employment in the basic sector. The new employment will increase demand for goods and services in the region thereby increasing employment in the non-basic industries producing those goods and services. As an example, the demand for

bread, milk, and houses is not derived from demand for these goods or services from outside the region and is classified in the non-basic sector (unless the production was designed to satisfy demand in another region). If employment at a steel factory selling its production outside the region increases, the new workers hired to increase production will produce demand for additional bread, milk and houses in the region. When the steel factory increased employment is due to demand outside the region, the increase in employment in bread, milk or housing production can be called indirect or induced.

The total economic activity changes are derived, directly and indirectly from changes in direct activity caused by change in external demand. Given the relationship between the direct change and the total change, the effects of changed external demand can be predicted. This presupposes that the directly affected industries and the induced or indirectly affected industries can be identified. The shift in focus from regional employment to regional industry employment creates additional difficulties addressed later.

Total economic activity is the sum of basic and non-basic activity. Expressed mathematically:

$$(1) T = B + N$$

Where T is total activity,

B is basic activity and,

N is non basic activity.

If M is the multiplier which describes the ratio of total activity to basic activity then we have:

$$(2) M = T/B$$

For prediction purposes the fundamental relationship in (2) may also be represented as:

$$(3) T = BM$$

Under certain stable conditions discussed later the multiplier may be presented as the change in total activity to the change in basic activity. Hence, intertemporal changes in economic activity may be used to calculate the multiplier. From (3) we also have:

$$(4) dT = dB(M)$$

Which can be restated as:

$$(5) M = dT/dB$$

1. The Employment Multiplier

As discussed in Chapter VI, employment may be used as a surrogate for total economic activity. The multiplier formula may be restated in employment terms.

$$(2.1) E_m = E_t/E_b$$

where E_m is the employment multiplier, E_t is total employment and E_b is basic employment. The employment multiplier may be used to describe the effect on total employment of changes in basic industry employment. The multiplier is the ratio of total employment to basic employment. Using the intertemporal change method the employment multiplier may be expressed from (5) as:

$$(5.1) E_m = dE_t/dE_b$$

The employment multiplier is the change in total employment divided by the change in basic employment.

2. The Income Multiplier

When income rather than employment is substituted into the activity formula, the multiplier of income can be derived in the same manner as the employment multiplier. It is the ratio of total income to basic income. The conceptual difference between the employment and income multipliers is only a matter of focus as they describe the same effect. The availability of reliable income information is considerably more limited than employment information. For this reason most studies have concentrated on the employment multiplier.

3. Multiplier Theory Problems

Certain assumptions about economic activity have been made in deriving the multiplier and in economic base theory. One assumption is that the regional economic growth is caused by increased outside demand, rather than by increasing demand from within the region. A second assumption related to this is that a stable proportional relationship of basic to non basic sectors exists. Also assumed is that expansion in the basic sector is carried forward into the non basic sector, and the effect in the non-basic sector is completed after some period of delay.

Aside from the difficulties inherent in the assumptions, an additional difficulty is that of actually determining basic or non basic employment. Several methods of making this determination have been developed and the most common ones will be examined.

4. The Basic Sector

The main method of direct determination of basic sector activity is by survey. This requires asking industries in each sector to divide their demand between demand generated from outside the region and internally generated demand. In even a medium size region the survey task is extremely costly and time consuming. In addition, many industries will not know precisely where their demand comes from. In the restaurant industry, for example, it is difficult to tell whether the clients are from the region or from outside. Among the non-survey techniques the most popular method appears to be the location quotient method and its variations. Also used are the minimum requirements or commodity balance approach, the assumptions approach, and the sensitivity approach [Ref. 10:21-25].

The location quotient will be examined in the following section. The minimum requirements approach assumes that some level of non-basic activity is required to sustain a region and that all activity above this level is basic. Glickman criticizes the minimum requirements approach for leading to the conclusion that all production goes for

export since by disaggregation the minimum employment in any industry may be driven to zero if enough varying regions are studied to find the minimum. He concludes that this approach understates non-basic employment [Ref. 10:24].

The sensitivity approach divides activity into sectors by determining the sensitivity of an industry's employment to changes in total employment. This method was used by Sasaki [Ref. 20:298-304] and was also proposed in a variant form by Mathur and Rosen [Ref. 16:93]. Finally the assumptions approach takes an educated look at each industrial sector and determines in light of local conditions whether that industrial sector is basic or non basic.

5. The Location Quotient

The location quotient attempts to determine the specialization of an area in a particular industry compared to the nation as a whole. The comparison variable may be income, employment or any other variable by which the interested specialization may be measured. For employment the location quotient (LQ) is the ratio of industry employment share in the region to industry employment share in the nation. Using E to represent employment, i an industry, j a region and c the nation, this ratio may be written as follows:

$$LQ = \frac{\text{industry i employment in region J (EiJ)}}{\text{employment in region J (EJ)}} \div \frac{\text{industry i employment in the nation (Eic)}}{\text{employment in the nation (Ec)}}$$

In mathematical terms this becomes: $LQ = E_{iJ}/E_J/E_{ic}/E_c$

If a region has an industry with a quotient greater than 1, then employment and by extension output is relatively greater in this region than in the nation. If the nation is considered self-sufficient and self-contained then production in a region in excess of its proportion of the national production will be extra to the region and be caused by demand external to the region.

An assumption made here is that the nation is self-sufficient, that it neither imports nor exports. If national industry employment includes employment for export from the nation, then the location quotient for local self-sufficiency should be regional industry employment share divided by national domestic only industry employment share. Inclusion of the national export employment will understate the location quotient for that industry in the region.

When the location quotient has a value equal to one this suggests a regional industry which is neither a net importer or exporter. It supplies the same proportion of output to the region as the national industry does to the nation. A value less than one suggests that production in the region is less than enough to meet regional needs, the products of this industry are absorbed locally, and additional imports are required to fill local demand.

The assumption is made that all local demand is filled by local production. Hence when an industry has a location quotient less than 1 that industry's employment is assigned as non-basic. Where cross hauling between regions, and between the region and the nation exists, the industrial sector assignment of all employment as non-basic when the location quotient is less than one understates the export base and overestimates the multiplier.

The location quotient focuses on sectors and more directly on those sectors in which the region is specialized (E_{ij}/E_j exceeds E_{ic}/E_c), those which contain all basic employment. All industries in which the region is non-specialized ($LQ < 1$) have their employment classified as non-basic. Even if an industry exists solely for export from the region, if its location quotient is less than 1 its employment will be counted as non-basic. Further the location quotient is affected by the relative size of the industries. A region with a very large export industry (such as agriculture in Monterey County) may have large total

employment relative to employment in the other industries. Thus the location quotient E_{ij}/E_j for the other industries will be reduced as the large export industry increases the magnitude of E . Shift share analysis identifies specialization without regard to total regional employment and is not biased by the existence in a region of a very large export industry. For this reason a determination of basic employment using the shift share concepts developed in Chapter VI will be discussed as well as the other variants of location quotient.

6. Variations To The Location Quotient

Morrison and Smith discuss variations to location quotients which have appeared in the literature. Some of these variations were the purchases only location quotient, the cross industry location quotient, the modified cross industry quotient, logarithmic cross quotient, modified logarithmic cross quotient, and the supply demand pool. They conducted an empirical test against survey data to determine which method came closest to matching the empirical results of the survey. The simple location quotient was found to be the most successful in approaching the empirical survey results of any non-survey technique [Ref. 18:7-8,13].

The Economic Impact Forecast System developed for the Army by the Construction Engineering Research Laboratory (CERL) uses the simple location quotient technique to identify basic and non-basic employment. The laboratory determined that as the level of disaggregation of data increases the location quotient is reduced and approaches other empirical results. For their purposes CERL uses data disaggregated to the fourth digit of the Standard Industrial Classification [Ref. 25:11].

7. Proposed Shift Share Analysis Technique

The location quotient, also known as the coefficient of specialization, attempts to determine the relative specialization of an industry in a region [Ref. 10:22]. As discussed in Chapter VI, shift share analysis also provides identification of specialization in a region. Location quotient has been defined in mathematical terms as:

$$(6) \quad LQ = E_{ij}/E_j/E_{ic}/E_c$$

When expressed in the same term as shift share analysis the location quotient formula becomes:

$$(6.1) \quad LQ = (b_{ij}/b_j)/(b_{ic}/b_c) = (b_{ij}/b_j)(b_c/b_{ic})$$

The difference between forms (6) and (6.1) is that employment E is now more specifically identified to a base period b. The proportion of an industry employment which is basic is determined by:

$$(7) \quad X_{\text{basic}} = (LQ - 1)/LQ$$

Substituting the terms of (6) into (7) we obtain:

$$(8) \quad (((b_{iJ}/b_J)(b_c/b_{ic})) - 1) / ((b_{iJ}/b_J)(b_c/b_{ic}))$$

Actual basic employment (E_b) is calculated by multiplying industry employment by the proportion of industry employment which is basic.

$$(9) \quad E_b = (b_{iJ})(((b_{iJ}/b_J)(b_c/b_{ic})) - 1) / ((b_{iJ}/b_J)(b_c/b_{ic}))$$

This may be simplified to:

$$(10) \quad E_b = (b_{iJ}) - (b_J(b_{ic}/b_c))$$

This is identical to the specialization component of the allocation effect described in Chapter VI. The location quotient technique as used by CERL is static. It deals only with the base period b . Multipliers calculated from it are limited to the form $M = T/B$ and are not found by comparing employment in a region for two different time periods.

The change in regional employment over time may be separated into change in the industry generally and other change. Where change in the region exceeds change in the nation the excess change represents demand shift from other regions to the region under study. The demand shift change is change due to outside demand. Change in basic employment should be therefore absolute change in regional industry employment less the change in national industry employment. By shift share analysis:

$$R = N + M + S + A$$

The change in national industry employment is the change in national employment plus the excess of industry change over national change $N + M$. Thus $R - (N+M) = S + A$. From Chapter VI equations (6) and (7) we obtain:

$$(11) S_{ij} = (b_j(bic/bc) [((f_{ij}-b_{ij})/(b_{ij})) - ((f_{ic}-b_{ic})/(b_{ic}))])$$

and

$$(12) A_{ij} = [(b_{ij}) - (b_j(bic/bc))] \\ \times [((f_{ij}-b_{ij})/(b_{ij})) - ((f_{ic}-b_{ic})/(b_{ic}))]$$

$S+A$ then can be obtained by adding (11) to (12) to obtain:

$$(13) SP = (b_{ij}) [((f_{ij}-b_{ij})/b_{ij}) - ((f_{ic}-b_{ic})/b_{ic})]$$

This dynamic definition of basic employment is beginning employment multiplied by the excess of regional industry growth over national industry growth.

8. Selection Of A Technique

The simple location quotient technique was selected for further examination due to its technical acceptance in the absence of survey data. The proposed dynamic method from shift share analysis was also selected for further examination.

B. THE MONTEREY COUNTY ECONOMIC BASE

1. Location Quotient Technique

Using the simple location quotient technique, a location quotient for each four digit coded industry in the Standard Industrial Classification (SIC) was

determined. Based on the location quotient derived, industry employment was divided into basic and non basic components. These results were modified for certain industries based on other assumptions.

a. Assignment Method

Initially the location quotient was determined for every industrial group at the four digit SIC level. Where the location quotient was less than or equal to one all of that industry's employment was assigned as non-basic. Eighty-three industries at the four digit level were determined to have location quotients greater than 1. The interpretation is that the portion of employment represented by the excess of the quotient greater than one is the portion of employment engaged for export. The formula for determining this excess to be assigned to the basic sector is:

$$100(LQ-1)/LQ = \% \text{ basic employment}$$

For three industries, knowledge or assumptions about the industry were applied to determine the export sector. These industries were federal military, federal civilian, and the hotel and motel industry. The federal military sector size is determined completely by outside forces and is not subject to or dependent on local demand or need. For this reason all of the military personnel were assigned to the export or basic sector. The federal civilian sector is not so clearly exogenously dependent. Some workers such as postal workers may be provided based

on local demand for mail service. Others, especially those at Fort Ord are assigned without regard to local needs. The exact determination of the relationship of federal civilian employment to local employment is not clear. The assumption has been made for this research that all Federal civilian employment is basic. A possible alternative determination method would be to determine the ratio of Gross Regional Product to Gross National Product and apply the ratio to the number of federal civilian workers to determine the normal or non-basic share of federal civilian employment.

The hotel and motel industry in Monterey County is oriented to providing tourist services. While some small portion must serve local temporary housing demands from new residents, the vast majority of demand is from tourists or visitors. Based on this orientation it was assumed that all hotel or motel related employment is basic.

b. Summary Of Basic Industry Employment

As described, eighty three industries were determined to have location quotients greater than one, and three additional industries were assigned to the basic sector by assumption. The proportion of basic workers in each of these sectors was multiplied by the 1972 employment level to determine the number of basic workers in the sector. Summaries of basic employment were made at a less disaggregated level by adding the basic workers in

the subsectors together. Finally total regional basic employment was summarized from the total of basic workers in each sector. As an example of this process, at the lowest level local trucking and storage (SIC 4214) was determined to have a national employment share of .096% and a regional employment share of .338%. Regional employment share divided by national employment share yields the location quotient 3.535. This meant that 71.7% of the 346 jobs in this subsector ($(2.535/3.535) = .717$) or 248 jobs were basic. This was the only subsector in the trucking sector with basic employment. These 248 jobs are also listed at the trucking sector level (SIC 4200) as basic. Next the 248 basic jobs were added to other basic subsector jobs to make up the 939 export related jobs at the Transportation, Communication, and Public Utilities level (SIC 40--). Finally the 248 jobs were added to all other subsector basic employment to calculate the region wide export employment of 53,860. The summary process is described in Table XXXIX.

TABLE XXXIX
Export Employment Summary

SIC	INDUSTRY	BASIC EMPLOYMENT	TOTAL EMPLOYMENT
4214	Local Trucking and Storage	248	346
4200	Trucking	248	841
40--	Transportation Communications and Public Utilities	939	3667
----	TOTAL	53860	102288

SOURCE: Construction Engineering Research Laboratory

c. Multiplier Derivation

Based on the summary basic employment level calculated, and presented in Table XL, the basic employment multiplier was calculated. As defined in equation (2) the multiplier is equal to total regional employment (102,288) divided by basic employment (53,860). The multiplier calculated from the data presented in Table XXXVI is 1.899. Interpreted this means every new basic sector job will increase total employment by 1.899 jobs.

TABLE XL
BASIC INDUSTRY EMPLOYMENT
LOCATION QUOTIENT TECHNIQUE
MONTEREY COUNTY
1972

INDUSTRY	BASIC EMPLOYMENT	TOTAL EMPLOYMENT
CONSTRUCTION	17	2,712
DUR MFG	1,232	3,692
NON DUR MFG	38	189
FOOD+KINDRED	2,423	3,242
TCPU	939	3,667
WHOLESALE	651	2,048
RETAIL	1,010	13,599
FIRE	97	2,589
SERVICES	3,400	11,768
FED CIV	6,740	6,740
FED MIL	33,992	33,992
STATE+LO	0	12,284
AGRICULTURE	9,889	11,745
MINING	174	459
TOTAL	53,860	102,288

SOURCE:
CONSTRUCTION ENGINEERING RESEARCH LABORATORY

2. Shift Share Technique

The values of N, M, S, and A were derived for each of the fourteen industry sectors in Chapter VI in Tables XXXII to XXXV, and the values are summarized in Table XXXVI. As discussed basic employment calculated from shift share analysis is postulated to be the sum of S and A. The change in total employment in each sector from 1972 to 1977 as well as the basic employment calculated from the sum of S and A are presented in Table XLI. For the retail trade total employment change between 1972 and 1977 was 3900. The proportional change in regional retail trade employment which exceeded the proportional change in national retail trade employment is the sum of the specialization (2136) and allocation (-382) effects (1754).

Based on the summary basic employment derived by this technique and presented in Table XLI, the basic employment multiplier was calculated from equation (6), as the change in total employment divided by the change in basic employment (8700/6937). The multiplier thus calculated is 1.254.

TABLE XLI
BASIC EMPLOYMENT
SHIFT SHARE TECHNIQUE
MONTEREY COUNTY
1972-1977

INDUSTRY	TOTAL EMPLOYMENT CHANGE	S	A	S+A SP
CONSTRUCTION	400	724	-323	401
DUR MFG	300	2353	2620	23
NON DUR MFG	800	2826	-2026	800
FOOD+KINDRED	200	120	790	199
TCPU	400	453	-147	306
WHOLESALE	-100	- 888	442	-446
RETAIL	3900	2136	-382	1754
FIRE	900	1039	-537	502
SERVICES	3200	205	- 49	156
FED CIV	200	112	83	195
FED MIL	-8200	-679	-5142	-5821
STATE+LO	3700	1919	-307	1612
AGRICULTURE	2800	2501	4626	7127
MINING	200	58	- 23	35
TOTAL	8700	+12763	-5826	6937

SOURCE:
AUTHOR

3. Multiplier Interpretation

The multipliers derived by the location quotient technique and by the shift share analysis technique attempt to predict the effect changes in the demand for exports from a region have on total activity within the region. The location quotient derived multiplier suggests a total employment change of 1.889 Jobs for each new basic Job and the shift share analysis technique suggests a total employment change of 1.254 Jobs for each new basic Job. As described, the lower shift share multiplier is a priori expected because the location quotient technique understates exports from non basic industries, understates basic employment and overstates the multiplier.

The application of the multiplier to changes in a particular industry employment to determine the impact of changes in that industry on the region must be done with great caution. The derived multipliers from either technique are averages for the region as a whole. The consumption patterns of an industry's employees, and the source of its other inputs from in or outside the region determine the impact of a given industry on its region. An industry with low paid workers who have little participation in the consumption sector or an industry which purchases its inputs from without the sector and exports the products will have a smaller impact than other industries less constrained. Calculation of the intersectoral flows and individual industry multipliers is

dependent on the existence of a regional input/output model and table of intersectoral flow coefficients. No input/output model for Monterey County has been developed, and such development is beyond the scope of this research. A better multiplier for each industry could be developed if an input/output model was available [Ref. 10:27].

Further analysis of impacts in Monterey County in this research will use the multipliers developed in this chapter with the recognition that individual industry multipliers may vary from the average multiplier developed.

VIII. IMPACT DETERMINATION

The passage of the National Environmental Policy Act gave rise to demands for environmental impact assessment of federal projects. The Construction Engineering Research Laboratory (CERL) developed for the Department of Army a computer based environmental impact projection model including an economic impact model. The economic model is embodied in the Economic Impact Forecast System.

This chapter will examine the methodology used by that system to project economic impacts. A set of alternate projection techniques will be developed and presented. Two sample scenarios will be presented for both projection techniques, and an evaluation of the predicted economic impacts of both techniques will be provided. The sample scenario will use the multipliers developed in Chapter VII and the economic data presented in Chapter IV and V.

A. THE ECONOMIC IMPACT FORECAST SYSTEM

The CERL developed economic impact methodology is based on economic base theory. The multipliers used in the projections were calculated from the location quotient techniques described in Chapter VII, and are subject to the limitations identified there. The calculations made after development of the multipliers are described in this

section. All information on the CERL's methods are taken from the Economic Impact Forecast System Version 2:0 Users Manual of July 1979 [Ref. 27].

1. The Inputs

CERL has developed several user input formats to produce varying scenarios of economic change, and has tailored the economic impact calculations into models to be responsive to several types of installations or changes in installations. The types of change anticipated by the model are construction of new government housing or other buildings on a military installation, or the change in mission of a military installation. The impact of ongoing operations of an ordinary or specialized training base are provided by two other models. The following section describes the purpose of the four models and the user input variables for each model. The output of each model will be described in a later section along with any standard internal inputs built into the models. The list of impacts provided by each model is identical.

a. The Construction Model

The construction model is tailored to project the economic impact of a construction project on a military base. The user inputs for this model are the dollar volume of the project, the percentage of this volume to be spent on

local supplies, services, and labor, the number of military families who will move into on-base housing as a result of the construction and their average income.

b. Operations and Maintenance Model

The operations and maintenance model calculates the impact of expenditures of military personnel and operations and maintenance funds for base operations. The variables entered by the user for this model are the amount of annual expenditures for services and supplies, the percentage of these expenditures which purchase labor, the number of civilian employees and their income, the number of military employees and their average income, and the percent of the military employees living on base.

c. Training Activities Model

The training activities model projects the impact of expenditures of military personnel and operations and maintenance funds for the base operations of training activities. It is a modification of the operations and maintenance model which takes into account the trainee income. The inputs for this model supplied by the user are the expenditures for local supplies and services, the proportion of these expenditures for labor, the number of trainees, their average income, and the percent of trainees living on base.

d. Mission Change Model

The mission change model considers a major change to a base operations and calculates the impacts of the change. The inputs for this model are the change in expenditure for services and supplies, the change in civilian employment and average civilian income, the change in military employment and average military income, and the percent of military personnel living on base.

2. The Calculations and Outputs

While each of the models is specifically tailored to account for the inputs, the outputs are identical and the calculation methods to obtain the outputs are conceptually identical for each model. The mission change model calculation, and variables and outputs will be discussed. The discussion will consider each of the outputs and its related variables and calculations.

a. Direct Volume

The output is the direct change in the economy caused by the expenditures for local supplies and services, civilian income and military income. The formula for the output is:

$$V_o = dE_{ss} + (dE_c)(I_c) + (dE_m)(I_m)(P_{ob})(P_{slo}) + (dE_m)(I_m) \times \\ (1 - P_{ob})(P_{slth})$$

Where dE_{ss} = change in local purchases for supplies and services,

dE_c = change in civilian employment,

I_c = average civilian pay,

dE_m = change in military employment,

I_m = military pay,

P_{ob} = percent military living on base,

P_{slo} = percent of income spent locally by on base personnel,

P_{s1} = percent of military income spent locally by off
base personnel

Change in direct volume is the sum of (1) the change in expenditures for local supplies and services, (2) the income of the changed civilian employment, (3) the income of the changed military force level on base spent locally, and (4) the income of the changed military force level off base spent locally plus expenditures for housing.

b. Export Multiplier

The derivation of the export multiplier (M) (employment multiplier) by the location quotient method is described in Chapter VII.

c. Change in Business Volume

The total change in business volume (dT) is the export multiplier (M) times the direct change in volume (V_o).

d. Induced Business Volume

The induced business volume is the total change in business volume (dT) less the direct change in business volume (V_o).

e. Change In Local Personal Income

Change in local personal income (dI) is the sum of (1) total change in volume (dT) less the direct change in military and civilian income (Z) times the ratio of the change in personal income from 1967 to 1972 to the change in total business volume from 1967-1972 (V), and (2) the direct change in military and federal civilian income (dI). That is:

$$dI = z (dT - z)(v)$$

$$z = (dEm)(1 - P_{ob})(P_{sl} + h)(I_m) + \\ (dEm)(P_{ob})(I_m)(P_{slo}) + \\ (dEc)(I_c)$$

$$v = (P_{72} - P_{67}) / (T_{72} - T_{67})$$

Where P_{72}, P_{67} are local personal income in 1972 and 1967 and T_{72}, T_{67} are total business volume in 1972 and 1967. The other variables of change in total business volume are described in a. above.

f. Change in Housing Expenditures

Change in expenditures for housing is the change in local personal income multiplied by the average propensity to consume housing services. The volume of this propensity in the model is a constant (.16).

g. Change in Non-Housing Expenditures

The change in non-housing expenditures is the change in local personal income multiplied by the average propensity to consume non-housing services, a constant value of .63.

h. Change in Local Employment

Local employment change is calculated from two separate steps. The first step is the determination of an "average value added per employee". This is the average value added per employee in an industry multiplied by the number of employees in the industry, with the results for all industries added together and divided by total employment. The 1972 value added data and 1970 employment data are used. In the second step the total change in business volume is divided by the average value added per employee to derive the change in total employment.

i. Assesed To Market Ratio

This ratio is a constant derived from the 1972 Census of Governments. It is the ratio of assessments in the county to actual market value of the property assessed.

j. Change In Local Property Values

The change in local property values is determined in two steps. First the market value of property is calculated by dividing the 1972 assessed value by the assessed to market ratio. The market value is multiplied by the ratio of the change in total volume to 1972 total business volume.

k. Change In Housins Investment

Housins investment propensity is considered a function of housins value. The change in housins investment is the change in housins expenditures multiplied by the 1972

ratio of rental values to housing values (a constant 7.75) and further multiplied by the propensity to invest in housing (a constant .06).

1. Change In Non-housing Investment

The propensity for non-housing investment is considered a function of non-housing expenditures at a constant rate of .12.

m. Change in Local Tax Revenue

Two components of tax revenue are calculated to derive total change in tax revenue. The first component is change in property tax revenue due to change in property values, and it is simply the change in property values found in J. above multiplied by the property tax rate. The second component is the change in sales tax revenue. The total change in business volume multiplied by the local sales tax is the change in local sales tax revenue.

n. Change In The Number Of School Children

The change in the number of school children is calculated by multiplying the change in civilian and military off-base employment by 1.5 children per family times the proportion of children under 18 in school. The proportion of children under 18 in school is the ratio of 1970 school population to 1970 census data for children under 18 in the county.

o. Change In School Costs

The change in the local cost of schooling is the change in the number of students derived in n. above multiplied by the 1972 average cost per student times the proportion of cost per student in 1970 locally funded.

p. Change In Other Government Costs

Local government costs to provide services other than education are the 1972 non-educational expenditures multiplied by the ratio of the change in total business volume to the 1972 total business volume.

q. Net Change in government costs

The government costs for schooling derived in o. above, and for non schooling derived in p. above together make up the total net change in local government costs.

B. ALTERNATIVE CALCULATIONS OF ECONOMIC IMPACT

Examination of the calculation methodology used by CERL and described in the previous section, reveals several calculations which are unsatisfying considering the economic base theory from which they should arise. As an example, the change in total business volume and by further extension personal income, is calculated from the employment multiplier, and not from an income multiplier in the CERL models. Total change in employment is indirectly calculated from change in business volume and value added per employee rather than directly from the employment multiplier. A

revised method of calculation for the outputs described above is provided from the methods developed in this research to assess economic impact.

1. An Income Multiplier

Development of an income multiplier for changes in military and civilian income is dependent on the availability of the intersectoral flow of military and civilian income into the local economy. The CERL methodology does provide an approximation of the flow in developing the average propensity to consume locally for civilian personnel, for military personnel on-base and for military personnel off-base. Glickman following Richardson [Ref. 10:17], and Bendavid [Ref. 2] define the income multiplier as $1/(1-\text{marginal propensity to consume locally})$. As the additional direct income is spent by new additional employees rather than by existing employees the average and marginal propensity may be assumed to be equal. For the three classes of employees the average propensity to consume as a group may be derived from the weighted average propensity of each class such that the group average propensity to consume (P) is given as follows:

$$P = dIc + dI_{mob}(P_{s1}) + (dI_{m} - dI_{mob})(P_{s1} + H) / (dIc + dI_{m})$$

$$dIc = (dEc) (Ic)$$

$$dI_{mob} = (dEm) (Im) (P_{ob})$$

$$dI_{m} = (dEm) (Im)$$

where dIc is change in civilian income,

dI_{mob} is change in on base military income,

dI_m is change in total military income,

P_{s1} is the percent of military income of on-base

personnel spent locally for non housing purposes,

H is the percent of military income spent off-base locally
for housing.

Based on this described propensity to consume (P), the income multiplier for use in the alternative calculations becomes $1/(1-P)$. This income multiplier differs from the CERL employment multiplier for several reasons. First it is specific to the military industry rather than an average for the region. Second income multipliers a priori exceed employment multipliers. This is because employment multipliers consider the ratio of total employment to basic employment, but some total employment is the result of spending in a region of income not generated by wage earners such as transfer payments. Third the location quotient techniques used by CERL understate the extent of basic employment as described in Chapter VII.

2. The Business Volume and Personal Income Outputs

The proposed alternative method of calculation of direct change in business volume is similar to the method in the CERL models. However, instead of assigning the average income to all military personnel, the proposed alternative method uses lower average income for bachelors than for married personnel, and higher average income for off-base married personnel than for on-base married personnel. Where military housing on base is full, the proposed alternative method assumes all new personnel will exhibit the same ratio of married personnel as existed before the change. In addition any increase in personnel will result in all new married personnel living off-base, while any decrease will come from the off-base population leaving military housing full. The method of calculating the input of percent on base is not specified in the CERL model. Where the CERL method multiplies changes in direct volume by the employment multiplier to obtain the total change in business volume, the proposed alternative method would be to use the income multiplier, as business volume is an income rather than an employment concept. The induced change in business volume would remain the total change in business volume less the direct change in business volume. Personal income change should be the sum of direct change in personal income plus the induced change in personal income. The direct change in personal income is change in military and civilian income. Using the assumption that the ratio of business volume to

personal income is stable the induced change in personal income should be the induced change in business volume multiplied by the ratio of business volume to personal income. This ratio is described in A.2.e. above.

3. Housing And Non-Housing Expenditures

Just as change in personal income consists of direct and induced components, change in consumption expenditures should be arrived at for each component, direct and induced. For housing expenditures the direct component is the change in the direct housing expenditures of off-base military and civilian personnel. The induced component is induced personal income multiplied by the propensity to consume housing developed by CERL.

4. Change In Local Employment

In attempting to avoid the use of the average regional employment multiplier to determine change in local employment due to the military sector, CERL uses the employment multiplier to derive change in total business volume, divides that change by the value added per employee in 1972. Inflation affects this calculation since the base value added per employee in 1972 is in 1972 dollars and the total business volume is in current dollars. If change in real total business volume were used, the assumption of a stable value added per employee is still made. As an alternative the direct use of the shift share analysis

employment multiplier modified by the propensity to consume of employees in the federal military industry will be used to determine change in local employment.

5. Other Changes

In addition to the outputs described above, the CERL models calculate change in property values, local tax revenue, local government costs, housing investment and non-housing investment. An alternative calculation method is proposed only for local government non-school revenue, but the following comments are offered on some of the other CERL calculation methods. Change in property values is calculated by CERL as a function of change in business volume. In the study of 15 communities affected by base closures done by Lunch, property values were markedly unaffected by the base closures except for very low income housing values [Ref. 14]. Also for Monterey County the extremely tight housing market described in Chapter IV suggests that property values probably would not decline in proportion to decline in business volume.

Local government costs are considered by CERL to be functions of business volume and school populations. The unstated assumption underlining this is that all government costs are variable. If a marginal cost per student or per dollar business volume could be calculated this would more closely reflect the anticipated impact.

In the CERL model local government non school revenues consist of property tax revenue and sales tax revenue. Property tax revenue is considered a function of property values, which are in turn a function of business volume. As discussed the link between business volume and property values was not supported in Lynch's 15 community empirical study. In addition property taxes are based on the assessed value of the property. Under Proposition 13 in California, assessed values are changed primarily only when a house is sold. Thus the change in property tax revenue becomes a function of housing market turnover rather than property values.

The sales tax component of local government revenue in the CERL model is directly proportional to the change in business volume. As defined business volume includes retail sales, wholesale sales, and value added by manufacturing. Only retail sales generate sales tax revenue, and change in taxable retail sales directly drives sales tax revenue. The proposed alternative method of calculating the sales tax revenue change is to first consider retail sales synonymous with non-housing expenditures and then calculate change in sales tax revenue as proportional to the change in direct and induced non-housing expenditures.

An element of local government non-school revenue not considered explicitly in the CERL model is state subventions to cities and counties on a per capita basis. The state subventions to local governments due to the military

population in Monterey County were shown in Chapter V, and are included in the proposed alternative method of calculating local government non-school revenue.

C. IMPACT SCENARIO

To demonstrate calculations of the economic impact of a change in the personnel levels or spending of a military installation on the local economy, two change scenarios for Fort Ord are developed in this section. The first scenario is an increase in the military strength at Fort Ord to bring it to a full division. This will increase the military personnel assigned to 25,000 from 16,729. The second scenario will be a 10% reduction in civilian and military personnel and spending for local supplies and services. Each scenario will be evaluated by the CERL method and by the proposed alternative, and the results of the evaluation and the differences between the methods presented.

1. Increase To Full Division

The mission change model as stated in A.1.d. above considers a major change in mission. Its inputs are change in expenditures for local supplies and services, change in civilian employment and income and change in military employment and income. For this scenario the inputs or changes will be:

Change in expenditures for local supplies and services:
\$34,000,000

Change in civilian employment: 0

Change in military employment: +8,271

Average military income: \$11,769

Percent military personnel living on base: 13

The CERL calculations are presented in Table XLII, the alternative calculations are in Table XLIII.

TABLE XLII
FORT ORD INCREASE TO FULL DIVISION
CERL METHOD

IMPACT	AMOUNT
DIRECT VOLUME	\$ 81,853,000.
EMPLOYMENT MULTIPLIER	1.8991
CHANGE IN BUSINESS VOLUME	155,451,000.
INDUCED BUSINESS VOLUME	73,598,000.
CHANGE IN LOCAL PERSONAL INCOME	173,869,000.
CHANGE IN EXPENDITURES FOR HOUSING	31,296,000.
CHANGE IN NON-HOUSING EXPENDITURES	109,537,000.
CHANGE IN LOCAL EMPLOYMENT	15,360
ASSESSED TO MARKET RATIO	16.70
CHANGE IN LOCAL PROPERTY VALUES	394,136,000.
CHANGE IN HOUSING INVESTMENT	14,553,000.
CHANGE IN NON-HOUSING INVESTMENT	13,144,000.
CHANGE IN TAX REVENUES	53,578,000.
CHANGE IN NUMBER OF SCHOOL CHILDREN	6,990
CHANGE IN STATE AND FED AID TO SCHOOLS	3,567,000.
CHANGE IN COST TO SCHOOLS	4,325,000.
CHANGE IN OTHER GOVERNMENT COSTS	10,041,000.
NET CHANGE IN COSTS TO LOCAL GOVERNMENTS	14,365,000.

SOURCE: CERL

**TABLE XLIII
FORT ORD INCREASE TO FULL DIVISION
ALTERNATIVE METHOD**

IMPACT	AMOUNT
DIRECT VOLUME	\$ 87,257,040.
EMPLOYMENT MULTIPLIER	2.4096
CHANGE IN BUSINESS VOLUME	210,254,563.
INDUCED BUSINESS VOLUME	122,997,523.
CHANGE IN LOCAL PERSONAL INCOME	313,075,495.
CHANGE IN EXPENDITURES FOR HOUSING	49,470,378.
CHANGE IN NON-HOUSING EXPENDITURES	179,097,140.
CHANGE IN LOCAL EMPLOYMENT	9,500
CHANGE IN TAX REVENUES	2,444,241.

SOURCE: AUTHOR

2. Ten Percent Reduction

The second scenario is a projected 10% reduction in operations at Fort Ord from the 1978 levels. For this purpose the following basic inputs were used:

Change in expenditures for local supplies and services:

-\$6,800,000

Change in civilian employment: -225

Average civilian income: \$16,094

Change in military employment: -1673

Average military income: \$10,649

Percent of military personnel on base: 47

The results of the evaluation of this scenario are presented in Table XLIV for the CERL generated model and in Table XLV for the alternative model.

TABLE XLIV
FORT ORD 10% REDUCTION
CERL METHOD

IMPACT	AMOUNT DECREASES
DIRECT VOLUME	\$ 18,089,000.
EMPLOYMENT MULTIPLIER	1.8991
CHANGE IN BUSINESS VOLUME	34,354,000.
INDUCED BUSINESS VOLUME	16,265,000.
CHANGE IN LOCAL PERSONAL INCOME	38,302,000.
CHANGE IN EXPENDITURES FOR HOUSING	6,894,000.
CHANGE IN NON-HOUSING EXPENDITURES	24,130,000.
CHANGE IN LOCAL EMPLOYMENT	3,394
ASSESSED TO MARKET RATIO	16.70
CHANGE IN LOCAL PROPERTY VALUES	87,102,000.
CHANGE IN HOUSING INVESTMENT	3,206,000.
CHANGE IN NON-HOUSING INVESTMENT	2,896,000.
CHANGE IN TAX REVENUES	11,840,000.
CHANGE IN NUMBER OF SCHOOL CHILDREN	1,080.
CHANGE IN STATE AND FED AID TO SCHOOLS	551,000.
CHANGE IN COST TO SCHOOLS	668,000.
CHANGE IN OTHER GOVERNMENT COSTS	2,219,000.
NET CHANGE IN COSTS TO LOCAL GOVERNMENTS	2,887,000.

SOURCE: CERL

TABLE XLV
FORT ORD 10% REDUCTION
ALTERNATIVE METHOD

IMPACT	AMOUNT DECREASES
DIRECT VOLUME	\$ 19,805,638.
EMPLOYMENT MULTIPLIER	2.5424
CHANGE IN BUSINESS VOLUME	50,353,854.
INDUCED BUSINESS VOLUME	30,548,216.
CHANGE IN LOCAL PERSONAL INCOME	76,423,972.
CHANGE IN EXPENDITURES FOR HOUSING	10,537,260.
CHANGE IN NON-HOUSING EXPENDITURES	40,740,488.
CHANGE IN LOCAL EMPLOYMENT	2,200
CHANGE IN TAX REVENUES	472,429.

SOURCE: AUTHOR

D. MODEL COMPARISON

For each scenario, the CERL calculation method and the proposed alternative calculation method produce different results. The differences between the calculation methods appear in direct volume, the multiplier, the total change in business volume, induced business volume, local personal income, housing and non-housing expenditures, local employment and local government tax revenue. The differences between the calculation method for the increase to full division scenario are shown in Table XLVI and the differences for the 10% reduction scenario are shown in Table XLVII. The elements to which these differences are attributable will be discussed for each scenario and each impact line.

1. The Full Division Scenario

Change in direct volume is higher in the proposed alternative calculation method because the majority of the new military personnel are married off-base with an attendant higher than average military income than the simple average used in the CERL model. The CERL employment multiplier is less than the income multiplier used in the alternative calculation. The reasons for the difference in the multiplier are detailed in section B.1. above. Taken together the increased multiplier and the higher change in

direct volume account for the proposed alternative higher change in total and induced business volume. The difference in local personal income is also attributable to the difference in business volume, as it is a function of total business volume. The difference in expenditures for housing and non-housing relate to the difference in personal income because both expenditures in both calculation techniques are functions of personal income. The CERL model uses a higher employment multiplier derived from location quotient techniques than the shift share analysis derived and military local spending propensity modified alternative employment multiplier. This results in a higher predicted impact in the CERL model than in the alternative. The reason for the large difference in local tax revenues is the inclusion by CERL of property tax changes induced by property value change and ultimately business volume change. These differences are explained in greater detail in section B.5. above.

2. The Ten Percent Reduction Scenario

The differences between the calculation techniques are proportional, of the same order of magnitude and have the same sign as the differences discussed for the full division scenario. What is noteworthy is the absolute difference between the methods is reduced because of the relatively smaller change in manpower and direct business

volume in the reduction scenario. The implication of this is that for small changes in an installation the differences between the calculation techniques are small, but when the installation changes are larger the two calculation techniques present considerably different results. When a test is being made of the statistical significance of the predicted impacts, the difference in results obtained from the two calculation methods could affect the conclusions derived from the statistical test.

TABLE XLVI
FORT ORD INCREASE TO FULL DIVISION
METHOD DIFFERENCES
ALTERNATIVE METHOD LESS CERL METHOD

IMPACT	AMOUNT DIFFERENCE
DIRECT VOLUME	\$ 5,040,040.
EMPLOYMENT MULTIPLIER	.5105
CHANGE IN BUSINESS VOLUME	54,803,563.
INDUCED BUSINESS VOLUME	49,399,523.
CHANGE IN LOCAL PERSONAL INCOME	139,206,495.
CHANGE IN EXPENDITURES FOR HOUSING	18,174,378.
CHANGE IN NON-HOUSING EXPENDITURES	69,560,140.
CHANGE IN LOCAL EMPLOYMENT	-5,860
CHANGE IN TAX REVENUES	-51,133,750.

SOURCE: AUTHOR

TABLE XLVII
FORT ORD 10% REDUCTION
ALTERNATIVE METHOD LESS CERL METHOD

IMPACT	AMOUNT DIFFERENCE
DIRECT VOLUME	\$ 1,716,000.
EMPLOYMENT MULTIPLIER	.6433
CHANGE IN BUSINESS VOLUME	15,999,854.
INDUCED BUSINESS VOLUME	14,283,216.
CHANGE IN LOCAL PERSONAL INCOME	38,121,972.
CHANGE IN EXPENDITURES FOR HOUSING	3,643,260.
CHANGE IN NON-HOUSING EXPENDITURES	16,610,488.
CHANGE IN LOCAL EMPLOYMENT	-1,194
CHANGE IN TAX REVENUES	-11,367,571.

SOURCE: AUTHOR

IX. CONCLUSIONS AND RECOMMENDATIONS

This research has surveyed the literature on economic impact analysis. A number of analysis techniques and theoretical considerations were examined. From these techniques and theories, Shift Share Analysis, Location Quotients, and Economic Base Theory, were selected to receive in depth review and application. The economic impact model developed by the Construction Engineering Research Laboratory was studied closely and alternative calculation methodologies developed. This research surveyed the economy of Monterey County with special focus on the effects of Fort Ord on the county economy. Finally both the engineering laboratory economic model and the alternative model were applied to a set of impact scenarios to contrast the predictions of impact made by the two models. This chapter presents the conclusions and recommendations resulting from the research. Some areas for additional research are also suggested.

A. CONCLUSIONS

The descriptive survey of the Monterey County economy was presented in Chapter IV. The survey indicated that Monterey County is dominated by agriculture and government. Agriculture provides 12.7% of the county income and employs

19% of the workforce. Agricultural shipments in 1978 exceeded \$650 million. Federal, state, and local governments contributed 25.2% of the county personal income, and employed 21% of the county workforce. The largest source of personal income in the county, despite the dominance of agriculture and government, was unearned income totalling \$542 million in 1975, 29% of that year's total personal income. This unearned income was almost evenly divided between transfer payments and dividends, interest and rent. The county had very high housing costs, and a very tight housing market. Unemployment in the county exceeded the national average in each of the last three years. Even with these handicaps county population grew faster between 1970 and 1976 than the state or national population.

Fort Ord and its military, military dependent, and civilian employee population is a significant part of the Monterey County economy. Three cities within the county derive a considerable portion of their population from the personnel associated with Fort Ord. Seaside and Marina are predominantly populated by people associated with Fort Ord. In the case of Seaside 50.4% of the population and for Marina 61.0% of the population are Fort Ord related. The Fort is the largest employer in the county of both military personnel and civilians, although the proportion of county employment at Fort Ord has been declining due to decreased employment at Fort Ord coupled with increased employment in other industries. The influence of Fort Ord also is felt in

school populations (11% Fort Ord), housins (6% of off base housins occuiped by Fort Ord personnel), and retail sales (6% of retail sales to Fort Ord personnel). A substantial portion of local government revenue is generated by Fort Ord through Federal Impact Aid to Schools, sales taxes, and state per capita payments.

Shift Share analysis, is a type of variance analysis technique which decomposes change in regional and regional industry employment into components which indicate possible trends. Significantly, shift share identifies industries which are specialized in the local economy and the industries which are changing faster in the region than in the nation. The shift share analysis of change in Monterey County employment between 1972 and 1977 showed that the county specialized in four industries, federal civilian, military, food processing, and agriculture. In addition the analysis showed the county industries except for the wholesale trade grew at a faster rate than their national counterparts. Through the shift share method change in industry employment due to specialization or outside demand can be derived.

Economic base theory provided the theoretical basis for predicting the impact on a region of changes in external demand through the derivation and use of multipliers. Numerous techniques have been developed for multiplier determination but this research shows that two, the simple location quotient, and shift share analysis are particularly

appropriate. The shift share technique developed in this research overcame theoretical and practical difficulties inherent in the location quotient and other techniques. The shift share approach avoids the problem of single industry dominance of a small region, likely to exist where a military installation dwarfs the region in which it is located. The shift share approach also is dynamic in nature using intertemporal data and avoiding the assumption of a zero intercept economy.

The impact models developed by the Construction Engineering Research Laboratory (CERL) provide a simple to use method of estimating possible economic impacts of changes in military installations. Where the changes in employment or spending are of the order of 10% the difference between the CERL model projections and projections based on the calculations developed in this research are not material. For large changes of the order of 50% the differences in projections between the two calculation methods is significant especially with regard to impact on personal income, retail sales, employment and local government revenue. The CERL model may understate business volume changes and overstate employment changes due to differences in multiplier derivations between the CERL method and the alternative. The CERL method may also overstate changes in local government revenue.

B. RECOMMENDATIONS

1. The shift share method of deriving basic employment should be considered as a replacement for location quotients in regions dominated by a single industry, and perhaps for all regions.
2. The average region multiplier developed through shift share analysis should be adjusted for the military sector by applying the information developed by CERL and others on military propensity to consume locally.
3. The projections of regional economic impacts of changes in military installations should be done using the CERL developed Economic Impact Forecast System for changes on the order of 10%.
4. Both the Economic Impact Forecast System and the alternative calculations developed in this research should be used when changes in military installations on the order of 50% are being considered.
5. The development of regional input/output intersectoral flow tables should be considered to provide more accurate impact multipliers and indications of what sectors of the local economy are most heavily impacted.

C. CONTRIBUTION OF THE STUDY

This study has contributed new insight, techniques or methods in four areas. The four areas are the use of shift share analysis to derive change in basic employment, the method of modifying income multipliers to be industry specific, providing alternative calculations to the CERL model, and a comprehensive survey of the Monterey County economy. The use of shift share analysis to derive change in basic employment is a contribution because shift share analysis is not susceptible to bias due to single industry dominance typical of the location quotient technique commonly used and does not rely on single year data or on a zero intercept assumption. The derivation of an industry specific multiplier is also a contribution because it brings economic base theory multipliers into conceptual agreement with multipliers developed from input/output tables, and the specific multiplier reflects the intersectoral flow from that particular industry rather than the national average. Examination of the calculation methods on which the CERL Economic Impact Forecast System is based was presented in Chapter VIII. The information and linkages developed during the research provide contributions to modifying the CERL forecast system by identifying alternative calculation methods. Finally the comprehensive survey of the Monterey County economy should contribute to wider recognition of the importance of agriculture, government, food processing, and transfer payments to the county economy.

D. AREAS FOR ADDITIONAL RESEARCH

Fruitful areas for additional research arising out of the research herein presented occur in a number of topics. Additional research is recommended as follows:

1. The shift share derivation of basic employment should be compared to empirical results in a region where survey techniques have been used, to validate this approach.
2. The relationship of changes on a military installation to changes in housing and non housing investment, local government costs, and property values should be examined empirically.
3. The location quotient technique results were found to be improved by increasing the level of disaggregation of the data used. Shift share analysis may also be susceptible to improvement if applied to more disaggregated data.
4. The CFRL model combines the use of location quotient with assumptions made about particular industries to find basic employment. Modifying the shift share technique by assuming that hotel, motel, federal civilian, and military workers are by definition basic sector employees, may also

improve the shift share approach to deriving basic employment.

5. The consumption propensity data used by CERL to calculate local expenditures from military payrolls should be examined by comparing it to the data collected by the Department of Commerce on the expenditures of families by occupation of household head to determine if the percent spent locally is reasonable and also to develop the impacts of that spending on particular industries.

6. If possible a non survey method of developing intersectoral flow coefficients or input/output tables should be studied to apply to each county in the CERL data base to assess impacts on particular industries or sectors.

E. REVIEW OF THE RESEARCH QUESTION

The basic question prompting this research was whether a practical prototype model could be developed to assess the impact of domestic military installations on their local economies. The indications of this research are that such a model can be developed and in fact has been developed. The criteria for practical model were ease of use and reliance on published data. The Economic Impact Forecast System does provide a prototype model for assessing regional economic impact of military installations. The system may be used with little or no training in economics and at low cost. The data used by the model is available for every county in the United States. This research has also contributed alternative impact calculations which could be used directly to predict economic impact or could be used to modify the CERL model.

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